Assessing Primary Uses and User-Identified Benefits of Food Forests: A Study of Beacon Food Forest

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Abstract

As governments look to new methods for managing sustainability, resilience, and climate goals in their cities, food forestry has emerged as a novel form of urban green space with the potential to not only provide healthy and free food, but also mitigate climate change, support urban ecosystems, and promote holistic wellbeing among residents. This research investigates users' and community members' perceptions of the impact Beacon Food Forest (BFF) has on them or their communities. The survey and interviews use the conceptual framework of social-ecological systems and ecosystem services to identify the presence and relative importance of benefits and services provided by BFF as well as to assess place attachment among participants. My findings show that people use this food forest not only for harvesting edible or medicinal plants, but also for socializing, building community, improving their mental and physical health, deriving peace and joy, and reconnecting with nature. These serve to emphasize hypothesized benefits and services of food forests and support the integration of projects like BFF into the management of publicly owned land in the United States.

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Introduction

As urban areas and their residents face mounting issues related to climate change, the COVID-19 pandemic, and the social and environmental unsustainability of our economic system, it is becoming increasingly important for cities to prioritize the design and implementation of sustainable, multifunctional green spaces which can contribute to restoring natural ecological services in urban areas and increasing the resilience of urban systems, particularly food systems, on both social and ecological levels (Angelo 2017; Barthel et al. 2022; Colding and Barthel 2013; Marconi et al. 2022; Sardeshpande, Rupprecht, and Russo 2021). Urban community food forests are a type of multifunctional green space that scholars and practioners alike have identified as a means to build urban food security, produce food via ecologically regenerative practices, reduce adverse effects of urban life (e.g., pollution, heat island effect, surface impermeability), and provide interactive green spaces within the built environment (Hemmelgarn and Munsell 2021; Wiek and Albrecht 2021; Shi 2022; Nytofte and Henriksen 2019; Lovell and Taylor 2021a)Additionally, situating urban community food forests on public land with few-to-no barriers to residents' access may allow a broader range of people to experience the site's benefits than privately owned and operated food forests.

However, quantitative research of operational food forests seeking to establish evidence of these benefits is in a nascent state; structured qualitative and semi-quantitative research establishing users' interactions and relationships with urban community food forests is similarly sparse. In the same vein, the study of *public* urban community food forests in particular is distinctly lacking. To fully understand the value(s) of food forestry within urban commons, we must seek to understand who uses and benefits from public community food forest systems—

local residents or others—as well as how they are utilized and what benefits are perceived by its users.

This research uses Beacon Food Forest in Seattle, Washington as a case study and investigates: What do residents perceive as being the role of a food forest system within their community? What benefits or services does the food forest provide them? What type of value does it hold, and what level of significance in their lives? To that end, this research adopts a conceptual lens based on Elinor Ostrom's theory of social-ecological systems (SES), developed in the context of commons and collective action, which "[views] humans both as part of and actively shaping the ecosystems they depend on for development and well-being" (Masterson et al. 2019, 555).

Ultimately, this research seeks to provide information that will prove beneficial to researchers and practitioners of urban community food forestry alike who can use it to gain a more in-depth understanding of how these spaces are interacted with in the real world. Should it be found that urban food forests provide additional benefits or encourage interactions unique to these sites, there may be reason to promote the integration of food forestry into public land management through policy that either positively incentivizes food forestry projects or eliminates current barriers to their implementation.[1]

[1] This research draws heavily on research done by University of Montana graduate student Sarah Eiden and Dutch graduate student Ruby Rebisz.

Background

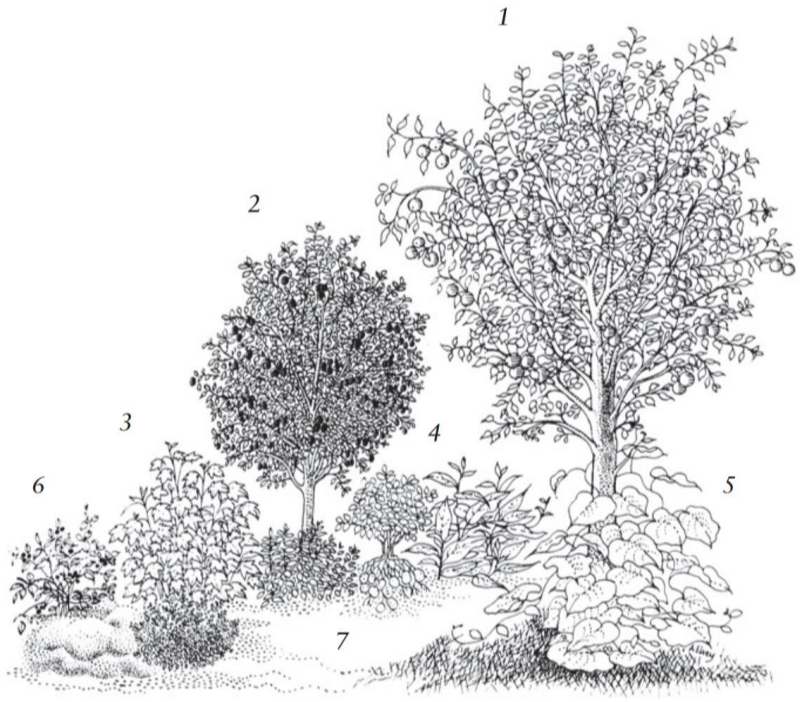
What is a food forest?

Although "food forest" is a twentieth century term, the concepts it encompasses are thousands of years old. Everywhere humans have settled, they have formed strong mutual relationships with their newfound ecosystems by necessity, tending and caring for wild spaces to the advantage of both themselves and the biosphere. These food systems, often referred to as forest gardens or forest farms, have "ensured the food security and nutrition of human populations since time immemorial" through intensive management of both pre-existing and intentionally planted forests (Mansourian, Wildburger, and Vira 2015, 74). To date, these methods have been documented in India, Indonesia, Sri Lanka, Vietnam, Morocco, Nigeria, sub-Mediterranean France and Italy, and across North and Central America, among other locations (Alvarado-Ramos et al. 2016; Armstrong et al. 2021; Hart 2009; Pinto-Correia and Vos 2004; Krüger 2016) People engaged with the native ecosystem in order to "enhance their production of a vast array of wild, semi-domesticated and domesticated foods, including fruits, nuts, tubers, leafy vegetables, mushrooms, honey, insects, game animals, fish and other wildlife" (Mansourian, Wildburger, and Vira 2015). Firmly based in geographically and culturally specific indigenous knowledge, these sites provided biodiverse, highly productive, and sustainable food systems for the groups stewarding them (Mansourian, Wildburger, and Vira 2015).

Though the history of agroforestry systems extends back several millennia, Western cultures often dismissed these practices as more the "primitive horticulture of a random collection of plants" than tried and tested food production systems capable of supporting whole communities, as they, in fact, were (Garrett, Jose, and Gold 2022; Lehmann et al. 2019, 1). This

rejection was influenced partly by European land use ideology, which regarded agriculture and forestry as strictly separate fields (Garrett, Jose, and Gold 2022, 27). Contemporarily, a food forest is a type of *agroforestry*, a synthesized field of study that refers to the intentional integration of annual or perennial cultivar cropping with food-producing or otherwise mutually beneficial trees, often along with some form(s) of animal husbandry; methods include forest farming, riparian buffer zones, windbreaks, silvopasture, and food forests (Garrett, Jose, and Gold 2022). As a form of agroforestry, food forests are embedded in principles of permaculture and agroecology, including but not limited to connectivity, biodiversity, promoting social-ecological health, collaboration, and co-creation of knowledge (Holmgren 1996; Gonçalves et al. 2020; Hart 2009).

Embracing the aforementioned principles, the physical structure of a modern food forest generally consists of three to seven strata of edible and medicinal woody perennial species, selected such that each species occupies an ecological niche and supports the health of other individual species as well as the ecosystem as a whole (Hart 2009; Eiden 2022; Wiek and Albrecht 2021a; see Figure 1). Practitioners specifically select a system's species to mimic the organization, stability, and diversity of a young forest, primarily using perennial plants, as well as self-sowing annuals, to do so. The species included in a food forest shift depending on a myriad of factors unique to its site and tenders: geography, climate, water availability, personal and community desires, and more impact site design.



Cross-section of temperate forest garden, showing seven 'storeys':
1. Canopy – largest fruit trees. 2. Lower fruit trees – dwarfing fruit trees. 3. Shrubs – currants and berries. 4. Herbaceacous – herbs such as comfrey. 5. Vertical-climbing berries and vines. 6. Soil surface – dewberries and creeping herbs. 7. Rhizosphere – vegetables and root layer.

Figure 1. Composition of a food forest (Hart 2009, 51)

Food forests come in various forms, are grown on private and public land, and have diverse leadership structures. This paper deliberately investigates *public urban community food forests*, defined as spaces purposefully planted with multi-strata, mostly perennial, edible plants with synergistic qualities, and are located in urban or peri-urban areas, occupy public land (whether leased by a non-governmental entity or not), and are publicly accessible or otherwise have few barriers to entry for community member involvement. While most food forests in the US are small-scale home operations, public community-based food forests are being increasingly designed and planted across the country. According to *The Community Food Forest Handbook*, published by Catherine Bukowski and John Munsell in 2018, there are "more than seventy community food forests in public spaces in the United States in communities of all sizes,

spanning from the Pacific Northwest to the Deep South," the oldest of which began in 1997 in Asheville, North Carolina (18). Most are significantly younger, though, as many community food forest sites were established in the years following the Great Recession due to the crisis leaving many people economically and nutritionally insecure (23).

Beacon Food Forest

Beacon Food Forest (BFF) is a public urban community food forest located in Seattle, Washington. It is nestled adjacent to Jefferson Park in the Beacon Hill neighborhood of Seattle (see Figure 2). The population of this area is ethnically and linguistically diverse, with a high proportion of immigrants and non-native English speakers, and a relatively high proportion of low-income households. In the four census tracts closest to the food forest, anywhere from 59-79% of residents identified themselves as non-white, and an estimated 17-43% of people were living in poverty. The Seattle Department of Neighborhoods also notes that there are twenty-three different languages spoken in the Beacon Hill neighborhood alone (City of Seattle n.d.; Seattle Department of Neighborhoods 2019; King County n.d.).

The stated goals of Beacon Food Forest are to "Create a community around growing and sharing food, (…) improve local food security by empowering the community to grow and harvest food on public land, (…) and to rehabilitate the local ecosystem and biodiversity" of the land ("Beacon Food Forest" n.d.). This food forest was selected as the site of this study due to its maturity, open-harvest policy, community focus, and position within a city whose residents have relative ease of access to green spaces of different types (e.g., parks, forests, field spaces). Seattle residents have stellar access to public green spaces compared to their counterparts in other large American cities; an estimated 99% of the population lives within a ten-minute walk of a public park space compared to the 55% national average (Trust for Public Land 2022). This trait

appealed in the context of this research because Seattle residents' knowledge of and experiences with other green areas may better equip them to recognize unique uses or benefits of a food forest system compared to residents of more 'park poor' cities; users in the latter may misidentify certain uses and benefits as 'unique' to a food forest system rather than a feature of parks in general, due to the inaccessibility of other public green spaces or a lack of amenities in said spaces.

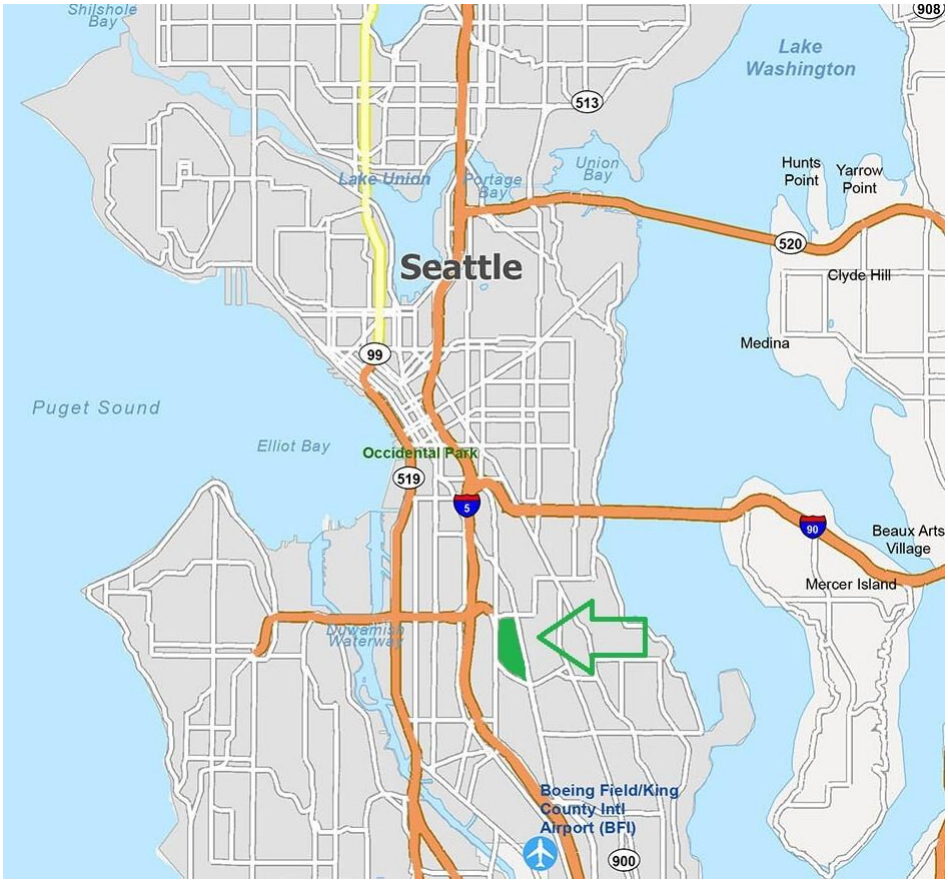


Figure 2. Map of Seattle with Jefferson Park highlighted in green (map adapted from GISGeography 2018)

The food forest was initially designed in 2009 by Beacon Hill neighborhood resident Glenn Herlihy and non-resident Jacqueline Cramer, along with two others, as their final project in a permaculture design course. Through his involvement with a local community group called Jefferson Park Alliance, Herlihy knew of several unused acres of land owned by the Seattle

Public Utilities (SPU) next to Jefferson Park—it was here that the group situated their plans for the food forest. Herlihy was also familiar with the wider community's desire to have some sort of garden in the area, leading himself and Cramer to host a community meeting and discussion regarding potentially implementing their design at the site (Bukowski and Munsell 2018, 186). Reactions from residents and community groups were "overwhelmingly positive" (185-186) and thus the organizing group, dubbed 'the Friends of Beacon Food Forest,' began the implementation process. They spent the next several years mired in bureaucratic processes, including rewriting codes and regulations, winning over agency allies, and partnering with the city's community gardening 'P-Patch' program as an umbrella organization for the project (187-190). Further community engagement meetings were well-attended by community members, helping the organizers incorporate the needs and desires of nearby residents into the final site plans. Notably, this included that BFF would be "a truly public, community food resource rather than a set of community garden plots distributed to lucky recipients," with areas designated for open harvest by anyone at any time and others designated for growing food to donate to local community aid organizations (193).

Organizers and volunteers broke ground on the first phase of the project in 2012, digging irrigation trenches, planting trees and other perennials, and installing multilingual signage along with "a composting area, an herb spiral, pollinator patches, a gathering plaza, a kitchen building, (…) a trellis, and benches" by the end of 2014 (193; see Figure 3).

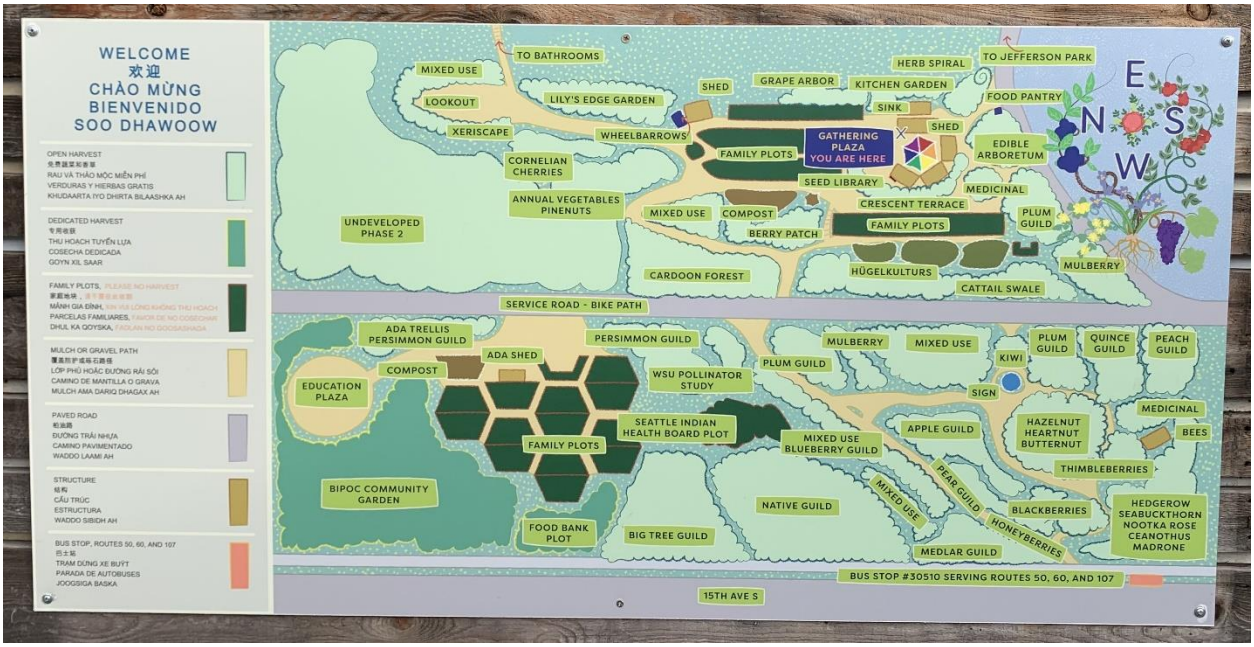


Figure 3. Map of Beacon Food Forest, January 2023

Naturally, other projects have also been carried out over the years, the most recent of which being the establishment of a BIPOC[2] Community Garden in August of 2022 as part of efforts to increase social and food justice within their space, recognizing the historical exclusion of these groups from equitable access to land and resources (Beacon Food Forest 2022). Beacon Food Forest is also preparing to smother and plant additional portions of its 7-acre site in the northeast corner; they originally focused on planting and tending only a portion of the land leased from SPU, but with that portion solidly established after ten years, volunteers are looking to complete the project by filling in the rest of the area available. BFF remains a volunteer-driven space which seeks to build community, provide environmental education, and promote positive land stewardship among its visitors and volunteers (Bukowski and Munsell 2018, 194).

[2] BIPOC stands for Black, Indigenous, and People of Color

Literature Review

How Do People Relate to and Value Green Spaces?

Within the field of environmental psychology, place attachment has been established as "a positive emotional bonding, which binds people to a particular place" (Dasgupta et al. 2022). This attachment is based on "the ability of a place to fulfil self-identity through emotional connections, aspirations, and belongingness," benefit individual physical and mental health, provide a "sense of community…[or] social security," and connect with the non-human natural environment through physical, emotional, or cognitive engagement (Dasgupta et al. 2022; Raymond, Brown, and Weber 2010). Site-specific green space research regarding place attachment has shown that many factors impact the degree to which users develop site attachment, and it is extremely likely that certain qualities such as the uniqueness of food forests contributes to the development of place attachment among food forest users (Artmann, Sartison, and Vávra 2020). Furthermore, place attachment has been linked with community attachment and interconnectedness, which strengthens and enriches individuals as well as communities (Arnberger and Eder 2012; Cattell et al. 2008).

Understanding that material and immaterial aspects of a green space have a significant impact upon how and to what degree individuals form an attachment with a given site, one must then adopt methods with which to identify and organize these aspects. Within social-ecological systems, Ecosystem Services (ES) are a way of conceptualizing the benefits (and disservices) that nature provides human beings and society. Originally conceived in the late 1960s and early 70s, the concept was initially associated with ecology economics and attempted to assess and assign monetary value to certain forms and functions of nature (Lele et al. 2013, 348). Related to

this analytic function, ecosystem services conceptually emphasized humanity's dependence on the sustained wellbeing of Earth's natural environments and processes for the continuation of our own societies and species as a whole (Groot, Wilson, and Boumans 2002, 2). Two primary frameworks for assessing the presence and impact of ecosystem services (ES) on human well-being and the value provided by nature to humans have been developed since the concept of ES emerged (Pandeya et al. 2016, 250) .

The first ES scaffolding was established in 2001 as a result of the Millenium Ecosystem Assessment (MEA) initiated by the United Nations(Millennium Ecosystem Assesssment 2005). In this framework, ES are classified into one of four value categories: cultural, provisioning, regulating, and supporting services, with 22 specific services identified across the mutually exclusive categories (see appendix A) (Alcamo et al. 2003, 56-60). While this framework is useful for identifying the services present in an ecosystem, it has been critiqued for failing to account for the multiple types of value which can be associated with a single ecosystem service; that is, a service cannot be identified and analyzed as belonging to more than one of the four value categories. The MEA framework also dichotomizes "instrumental vs. intrinsic approaches to nature valuation" (Rebisz 2021, 10), wholly separating services that benefit humans from those that benefit the natural world. Both of these critiques problematize the reification of the idea that humans are external to the Earth's ecosystem. Moreover, the MEA framing fails to account for the effects of mental and physical wellbeing and healing that nature provides. This is notable, as these are services demonstrated to be significant to food forest users (Eiden 2022, 74).

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services's (IPBES) framework for valuing nature's contribution to people was developed as an

improved iteration of the MEA ES framework. As such, it acknowledges human psychophysiological health as an ES and addresses the nuance and complexity of value types related to ecosystem services (see Appendix B). The IPBES organizes the values of services derived from nature as existing on a spectrum from intrinsically valued services—those inherent in nature without any relation to providing goods or services to humanity—to anthropocentrically valued services—those related to nature that humans utilize to support their wellbeing. The anthropocentric value category is further broken down into relational and instrumental value types, which differentiate between what benefits and services have value to humans simply for occurring—such as climate regulation—and what benefits and services have value due to their role as a means of producing a resource for humans, such as emotional wellbeing (Díaz et al. 2015). This framework also recognizes the multiplicity of value types associated with a single ecosystem service and encourages this holistic viewing of ecosystems (Rebisz 2021).

However, given that ecosystem services constitute a framework that originated from and inherently centers humans, it is an anthropogenic one and some scholars argue that "accepting [that] all values are anthropogenic provides a starting point for a more relevant, culturally sensitive, and open-ended scientific analysis" (Lele et al. 2013, 348). There is no non-anthropogenic value that can be afforded to an ecosystem service, as all values derive themselves from human sociocultural dynamics. In this sense, ecosystem services cannot be assessed independently from the sociocultural values which they take on. Therefore, this research uses ES as a purely conceptual framework by which to organize the potential uses and benefits of Beacon Food Forest that may be identified by participants, rather than an as an evaluative tool of economic impact or feasibility.

Benefits and Services of Urban Food Forests

Published empirical research on the benefits and services provided by urban food forests is sparse, given the relative youth of food forestry as a subject of academic inquiry. Lovell and Taylor (2021b) rightly claim that "the practice of [urban agroforestry] appears to outstrip the academic research on the design and dynamics of these systems, particularly for diverse multistory systems such as the food forest" (2).[3]The majority of knowledge pertaining to the design and function of food forest or temperate forest garden systems lies in gray literature and experiential knowledge passed between individuals. However, more general studies of agroforestry systems and urban green spaces can provide proxy knowledge of how food forestry, itself a form of agroforestry, can benefit urban spaces and people.

Agroforestry systems such as food forests can provide a multitude of benefits that can contribute to the sustainability and wellbeing of the social-ecological systems of cities. Among these are improved soil, air, and water quality; increased carbon storage in soil and biomass; microclimate regulation; mitigation of extreme weather events related to flooding and drought; creation of pollinator habitat and support of native bee species; and plant and animal biodiversity enhancement (Garrett, Jose, and Gold 2022; den Herder et al. 2021). Several studies specific to food forest systems have also been published over the past three years, establishing evidence that food forests can provide benefits such as increasing the urban tree canopy and urban carbon sequestration capacity. Lehmann et al. (2019) studied the carbon stock contribution of the understory of a 23-year-old food forest in the United Kingdom, finding that "temperate food forests provide an increase in carbon stock per area compared to other food production systems

[3] Source is "Designing Multifunctional Urban Agroforestry with People in Mind"

such as agriculture and pastures" (7). Additionally, a 2022 study of food forest sites in Florida found that these systems can help increase canopy cover in urban areas, a factor which has been shown to reduce negative effects of the urban heat island effect and enhance social capital among neighbors (Rockwell et al. 2022; Holtan, Dieterlen, and Sullivan 2015, 516). Given that urban food forests are a type of agroforestry, it is not unreasonable to hypothesize that they would provide similar ecosystem services as other agroforestry systems.

Nonetheless, the perennial nature of food-producing plants within a food forest differentiates these spaces notably from other forms of urban agriculture, which typically grow annual cultivars. While perennial plants may take longer to establish themselves and produce, many varieties of perennial vegetables are high in nutrients that people consuming industrial diets are most likely to be deficient in. This is especially notable as many urban neighborhoods are food swamps—areas with access to fast food restaurants but little to no sources of fresh, nutritious foods. Perennial plants also have higher carbon sequestration capabilities than annuals and do not require tilling, which would release stored carbon from the soil (Toensmeier, Ferguson, and Mehra 2020, 3). As such, wider adoption of perennial plants as food cultivars could reduce the impact of carbon emissions generated by industrial agriculture, posing a potential transition towards more sustainable and regenerative food production methods while simultaneously helping to alleviate the negative impacts of industrial malnutrition and lack of fresh food access.

While the quantity of food capable of being produced by food forest systems would likely not be able to fully support the caloric needs of the number of residents occupying urban areas today, it is possible that they could make a noticeable impact in the lives of residents living nearby. Indeed, researchers Clark and Nicholas (2013) found that urban agroforestry using fruit

trees planted on 37% of available public open space in Burlington, Vermont could theoretically provide all very food insecure citizens of the city with enough fruit to make up for their current caloric deficits. Public and vacant private lands are especially central to the viability of planting edibles for the purposes of public urban harvesting. Given the illegality of foraging in many city, state, and national parks, food forests could create legal areas for these activities (Linnekin 2018). One study noted that "publicly owned and managed lands appear to be particularly important to foragers. In the US, for example, parks in New York City, Philadelphia, and Seattle are among the most frequently mentioned foraging sites" (Shackleton et al. 2017, 5). This is of particular importance to those who already forage for and harvest wild edibles within city limits, whether for economic, personal, or cultural reasons, many of whom belong to already overpoliced racial or ethnic minorities (Arrington et al. 2017; Johnson Gaither et al. 2020).

Along with these notable ecological and food-provisioning benefits, agroforestry in an urban setting has the potential to provide some of the same mental and physical benefits associated with other forms of tree-based green space. It is well established that urban trees and forests can have significant positive impacts on human health and wellbeing. A 2020 review article by Wolf et al. assessing the literature concerning human health outcomes associated with urban trees (N=201), found that they had statistically significant positive impacts on many aspects of human health. These aspects include excess heat and thermal comfort; cognition and attention restoration; mental health, anxiety, and mood; psychophysiological stress; and immune function (7). In addition to the psychophysiological benefits of urban trees specifically, Fuller et al. (2007) found that increased biodiversity[4] within urban green spaces also positively impacts

[4] Defined as the plant species richness of a given study area

the degree to which an individual benefits from exposure to those green spaces. Additionally, while "benefits did increase with greenspace area, the relationships with plant (...) richness were generally stronger" (393). This suggests that food forests, which are often small but highly biodiverse spaces, may provide benefits which are comparable to larger, less biodiverse urban green spaces such as public parks. Based on the literature regarding the psychophysiological benefits of urban trees and green spaces it is reasonable to posit that urban community food forest systems are capable of providing the same services.

How Do Communities Value Food Forests?

None of the above research, however, considers how individuals might use and value these spaces, their benefits, and their services. human-landscape interactions and relationships may differ considerably from the theoretical interactions, uses, and benefits shared between the two. While scholars have reviewed literature suggesting the presence of ecosystem services in food forest systems, few have sought to understand the significance of said ES to food forest users themselves, and only one such study has been conducted in the United States (Eiden 2022; Rebisz 2021; Riolo 2019). Furthermore, given the differences in their research questions, study designs, and study populations, the few studies that have been published cannot be compared directly. For its part, Sarah Eiden's US-based master's thesis research synthesized the Millenium Ecosystem Assessment ecosystem services framework and two others to investigate the benefits and services users perceived their public community food forest as providing (2022). Dutch researcher Suzy Rebisz (2021), on the other hand, focused more heavily on the value attributed to food forest systems as a whole, synthesizing seven value themes that characterized stakeholder interactions with Dutch food forests (N=28) of varied structures and goals: ecology; biocultural

harmony and stewardship; knowledge and education; livelihoods and economic value; health and wellbeing; identity and community; and experiential perceptions.

Eiden's results show that inspiration was the most identified service of primary importance across the entire participant cohort, regardless of how long and in what way participants were involved with the Helena, Montana food forest. This was closely followed by food production and pollination, then recreation and environmental education (60). Though not all are identified as cultural values in the framework, these ES are both instrumentally and relationally anthropocentric, centering the direct benefits to humans provided by the food forest system. Compared to Eiden, Rebisz's survey respondents and interviewees expressed somewhat greater intrinsic values and less anthropocentric values of nature. Ecological value was the most common theme identified across survey and interview responses, though it was almost always identified alongside other of the more anthropocentric valuation themes, especially those of 'biocultural harmony and stewardship' and 'knowledge and education' (Rebisz 2021, 29). The results of these studies indicate that stakeholders who were surveyed at both the Montana food forest and the Dutch food forests recognize multiple, oftentimes simultaneous, values in the services which the food forest provides. The two studies' results support many food forest researchers and enthusiasts' assertion that food forest systems can provide complex webs of stacked, synergistic ecosystem services which are capable of addressing a range of community needs.

More research into how users of food forests engage with the spaces and the benefits they derive from them will be useful to either affirm or contest the uses, benefits, services, and values of food forests already identified by academics and practitioners or managers. Results may also provide future directions for research and community engagement, as it allows food forestry

groups to identify what aspects are most important to the real people affected by planting a food forest and, for under-appreciated or under-utilized resources, can illuminate what outcomes to focus on for outreach and site design (fresh food, social support, etc.)

Methods

Using Beacon Food Forest in Seattle, Washington—one of the longest standing community food forests in the country—as a case study, this research uses a mixed methods approach to assessing the uses and benefits of urban community food forests, their significance according to users, and the demographic makeup and spatial distribution of users, in order to better understand how and why these spaces are utilized. The study uses a survey of BFF users, administered via Qualtrics, as well as follow-up interviews with self-selected survey participants, which were conducted through Zoom. These research apparatuses were approved by the Occidental College Internal Review Board on November 8th, 2022, and subject consent was obtained prior to participation in either. Research was conducted primarily by me, Irene Wickwire. Both the survey and interview questions were developed with input and feedback from my academic advisor, Bhavna Shamasunder.

Survey Apparatus

A survey was created via Qualtrics and activated and distributed on December 12th, 2022. Survey questions were adapted from Eiden's 2022 master's thesis on food forests, specifically the community survey that she distributed to stakeholders of the 6th Ward Garden Park in Helena, Montana (Eiden 2022). Also utilized were Potschin and Haines-Young's framework for developing a place-based assessment of ecosystem services, the MEA ES framework, and the IPBES NCP framework (Díaz et al. 2015; Pascual et al. 2017; Alcamo et al. 2003; Potschin and

Haines-Young 2013). Together, these guided the categorization of the uses and benefits of BFF within survey questions as well as the value types—intrinsic, anthropocentric (instrumental), and anthropocentric (relational)— associated with them.

Participants were asked to answer questions regarding topics such as: the nature of their interactions with Beacon Food Forest, the frequency of their interactions, what significance they derive from interactions with BFF, what services or benefits they believe BFF provides the neighborhood community, what significance they believe these services and benefits have for the neighborhood community, their overall valuing of and attachment to BFF, and how unique the values and benefits provided by BFF are to participants. Likert scale questions were intended to measure the significance and meaning of the uses and benefits identified by participants. Lastly, statement agreement questions such as "I feel comfortable visiting Beacon Food Forest", also measured using a Likert scale, were asked to help gauge the level of meaning and belonging which participants associate with BFF. The survey also collected select demographic data such as age, ethnicity, income, educational attainment. For a comprehensive list of survey questions, see appendix C and appendix D.

Survey Outreach and Sampling Methods

Outreach to survey participants was conducted using an array of methods. An informational flyer including a QR code and Bitly link for the survey was posted to Beacon Hill neighborhood groups on Facebook and to Seattle or permaculture related subreddits on Reddit. It was also tweeted from my personal twitter account with tags related to Seattle, permaculture, and food forests. In addition, I reached out to neighborhood and community groups through email, Facebook, and Instagram about distributing the study survey. These included: Beacon Food Forest itself, Beacon Hill Council, Jefferson Park Council, El Centro De La Raza, and Beacon

Hill Garden Club. Finally, I distributed over 300 informational flyers to households within areas of the neighborhoods North and Southwest of Beacon Food Forest and Jefferson Park.

Of the organizations that were contacted to support outreach directly, only two responded: Beacon Food Forest and Beacon Hill Council. Beacon Food Forest replied that they must deliberate over whether they wished to partner to aid in distribution of the survey but did not send any further communication and did not respond to a follow-up message. Beacon Hill Council was enthusiastic about distributing the survey and it had been arranged to occur in mid-December 2022, but communication lapsed until January 2023. At this point, the initial version of the survey had been distributed via posts on social media as well as door-to-door.

However, the contact at Beacon Hill Council, with whom communication had been re-established, recommended simplifying some of the language in the informed consent form and making minor word or formatting changes to certain questions. Edits to the informed consent form included changing the phrase "The survey seeks to understand the relative significance of these benefits as well as whether these services and benefits differ from those derived from other outdoor spaces frequented by participants." to "The survey seeks to understand the significance of these benefits and whether they differ from those derived from other outdoor spaces." An example of a change in the format of a question was changing "how many times per month do you visit Beacon Food Forest for any reason?" from a slider-based question to a text box (with valid inputs set as any number from 0 to 31; see Figure 4).

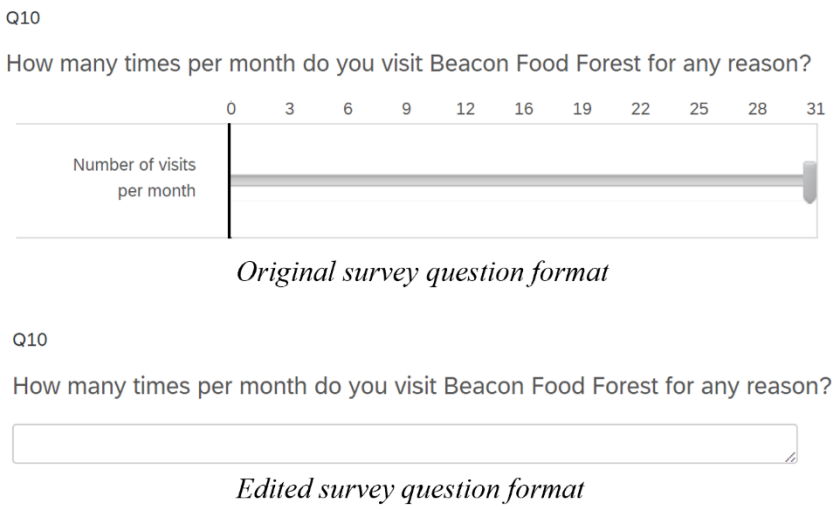


Figure 4. Survey Question Ten, Version 1 vs. Version 2

These edits were suggested to make the survey easier to understand and navigate for people taking it, especially given the neighborhood demographics. The survey was edited according to most of Beacon Hill Council's recommendations before being re-distributed via the council's emailing list.

Interview Apparatus

In addition to the community survey, I also conducted four semi-structured interviews with users of Beacon Food Forest. These participants were self-selected via the final question of the survey, which asked if the person taking the survey would be interested in participating in an additional short interview. Interviews occurred over Zoom and were recorded and transcribed for data analysis purposes. The interview lengths varied from approximately twenty to sixty minutes, depending on the participant. Interview questions probed for more detailed information about how users learned about and use the food forest, the services that users value most and why these are important to them, as well as if and how BFF is part of the neighborhood community. The questions asked of each interviewee differed slightly as they were modified based on the

interviewee's survey responses. A full list of the initial interview questions is available in appendix E.

Data Cleaning and Tools

Despite using several anti-fraud and survey bot detection options available in Qualtrics, both versions of the survey had issues with large volumes of bot submissions—that is, automated applications that attempted to mimic human responses. In general, these submissions tended to be much shorter in duration, started within seconds or minutes of each other, and contained nonsensical responses; still, some bots appear to have utilized Artificial Intelligence (AI) to generate plausible seeming yet falsified submissions. Exclusion criteria, a complete list of which can be found in appendix F, were adopted to consistently assess the legitimacy of a given submission. All bot responses were manually identified and removed from the dataset. Data from the surveys were exported from Qualtrics as two separate .xlsx files and subsequently imported into Microsoft Excel to be cleaned, formatted, and combined into one dataset. Between the two survey versions, a total of 315 responses were recorded; however, only 56 submissions were included. After deleting the fraudulent responses, several unnecessary data columns were deleted for ease of viewing, such as the total duration in seconds and percentage completed. The original alphanumeric response IDs Qualtrics produced were replaced by "SR" for "Survey Respondent" and a number between 1–56 (i.e., SR1, SR2, … SR56).

Given that most of the survey data variables were categorical, the data was analyzed primarily using pivot tables and simple Excel functions such as =SUM and =COUNTIFS. These methods were used to count the number of occurrences of particular answers and to convert those counts into percentages of the total responses for the given question. These percents were then compared to determine which were most or least frequently selected by participants.

Additionally, following the company's formatting advice for exporting Excel data, a sheet of all survey data including qualitative questions, was imported into Dedoose qualitative analysis software. Initially, codes were generated using a framework synthesized from the IPBES's NCP framework and the MEA ES framework. However, several additional codes such as "increased participation" and "decreased participation" were developed over the course of analysis; the full codebook can be found in appendix G. After tagging the survey responses with the appropriate codes, the program automatically performed a wide range of analyses, some of which were utilized in the results and analysis.

Survey Results and Analysis

Survey Respondent Demographics

Demographic data was pulled from the fifty-six valid survey responses. The data was analyzed using six demographic categories: ZIP Code, race/ethnicity, gender, age, educational attainment, and annual household income (see Table 1). A variety of ZIP Codes were provided by survey respondents, 50% of which were one of the two ZIP Codes most adjacent to Beacon Food Forest. A total of 82% of respondents provided ZIP Codes that are within the city of Seattle, while 18% came from other locations.

Educational Attainment	Percent
Bachelor's degree (ex. BA, BS)	33.93%
Master's degree (ex. MA, MS, MEng, MEd, etc.)	25.00%
Associates degree (ex. AA, AS)	16.07%
Some college, no degree	8.93%
Doctorate degree (ex. PhD, EdD, etc.)	7.14%
[No response]	3.57%
Trade school graduate	1.79%
High school diploma or equivalent	1.79%
Some trade school	1.79%

Race/Ethnicity	Percent
White	66.07%
Prefer not to answer	7.14%
Black	7.14%
Asian (Southeast, East, South)	7.14%
Indigenous (American Indian, Alaskan Native, Native Hawaiian, etc.)	3.57%
Latinx origin (any race)	3.57%
Filipino	1.79%
Latinx origin (any race), White	1.79%
Middle Eastern, White	1.79%

Income Range	Percent
Over $100,000	35.71%
$55,000-$69,999	21.43%
$85,000-$100,000	12.50%
$40,000-$54,999	10.71%
$25,000-$39,999	10.71%
$70,000-$84,999	5.36%
Prefer not to answer	3.57%

Age Range	Percent
35-44	39.29%
25-34	21.43%
45-54	19.64%
Over 65	8.93%
55-65	8.93%
18-24	1.79%

Gender	Percent
Female	51.85%
Male	37.04%
Prefer not to answer	5.56%
Non-binary / third gender	5.56%

Table 1: Demographics of survey respondents

Analysis showed that thirty-seven respondents (66%, *N*=56) identified their race as White, with the next most selected categories being Black, Asian, or Prefer Not to Answer, each of which had four respondents. The gender distribution of respondents aligned approximately with population averages, and the most common age range of survey respondents was 35-44. Survey respondents were highly educated; the most common educational attainment was a bachelor's degree (34.55%), followed by master's degrees (25.45%) and associate degrees (16.36%). A single participant (1.79%) selected a high school diploma or equivalent. Household income varied, with the most frequently selected household incomes being over $100,000 (35.71%) and between $55,000 and $69,999 (21.43%). A variety of other incomes were also present in the data, but none represented more than 12% of the survey sample.

To ascertain whether the survey sample was representative of the communities surrounding Beacon Food Forest, these demographic results were compared to the demography

of four census tracts surrounding Jefferson Park and the food forest: 100.01, 100.02, 104.01, and 104.02. However, a direct comparison is not possible for several reasons. First, the survey sample group was not restricted to the Beacon Hill neighborhood nor Seattle at large. Additionally, census tracts do not perfectly align with ZIP Codes, and the City of Seattle reports data categorized by census tract rather than by ZIP. Regardless, the analysis revealed that the survey sample, although similar in median income and education level, is not racially representative of the four selected census tracts. Whereas 66% of survey respondents selected only "White" as their race, the average percent of the population identifying as "non-Hispanic White" in the four census tracts is only 29.2%. Clearly, the sample of this study is heavily skewed and may be more representative of White perceptions of BFF than other groups.

Length and Frequency of Engagement

The survey results showed various levels and frequencies of engagement with the food forest. In a multiple-choice question asking respondents to select the most accurate description of their involvement level with Beacon Food Forest, no single option was chosen by a majority of participants. The three most common choices were "I visit the food forest infrequently, a few times per year" (17.86%), "I visit the food forest consistently throughout the year and am involved with volunteering or programs" (21.43%), and "I visit the food forest often throughout the year but I do not volunteer and I am not involved with programs" (21.43%). Furthermore, while 21.43% of respondents said that they visit 0 times per month, just under 70% said that they visit between 1 and 10 times per month.

The average monthly visits, including participants who responded with 0, was 4.5, or approximately once per week. It is possible that some of the 21% who visit 0 times per month are very infrequent visitors who go less than once per month. It may also be that they are people

who would not describe their interactions with BFF as ‘visits’, as they are usually passing through the food forest without the interaction being an intentional trip *to* the site. In fact, ten survey participants—in response to being asked if the nature of their interactions with BFF have increased, decreased, or remained the same over time—gave answers indicating that their participation is limited to walking through the food forest. Nevertheless, as people living in proximity to the site and who do interact with it, however briefly, their responses were included in the analysis.

In terms of the total length of involvement with BFF, most respondents have been involved for 4-5 years (23.21%), less than 1 year (16.07%), or 5-6 years (12.5%). However, besides these three groups, there was a relatively even distribution of the other lengths of participation. People who had been involved for 0 years or selected “not applicable” together comprised 12.5% of respondents. However, misunderstanding likely accounts for some number of these respondents, as SR43/INTVW3 expressed confusion about its phrasing; it implies active interaction and could easily be interpreted as asking for how long you have been volunteering or otherwise *actively* involved with BFF, rather than also encompassing *inactive* involvement. Also, as noted above, at least ten respondents identified themselves as mostly passive users who travel *through* the food forest rather than *to* it specifically, meaning that they may not perceive themselves as “involved” with the food forest.

Overall, many people described themself as having increased their participation with BFF over the span of their involvement; they often spoke of increased participation in tandem with beginning to volunteer or more frequently volunteering at the site. With this increased participation, volunteers increasingly viewed themselves as part of a larger community effort. For instance, SR14 said:

> When I first started working on it, I felt like it was just another volunteer job—and maybe even something that could fall apart pretty easily. But now, I feel like it's a real community project with a lot of potential for growth and improvement. It's so exciting to see what people are doing with all this space!

Even some of the people with mostly passive or indirect participation with the food forest increased their utilization of the site as well. SR46/INTVW2 said "I used to walk a different path, but now that so much changes regularly with the food forest, I make it a part of my walks." This indicates that, at least among some users, place attachment to BFF has strengthened over time; especially as they became more involved, they began viewing themselves as part of a communal effort. On the other hand, there were some participants who reported decreased involvement with the food forest, stating a range of reasons including the COVID-19 pandemic, the season at the time (survey responses were collected during January and February), change in physical ability, moving out of the neighborhood, and disagreement with how the food forest is being developed.

Purpose of Visit, Provision of Uses, and Benefits of Personal Value

Survey respondents were asked two questions pertaining to their personal uses of the food forest and the relative value of these uses. First, respondents were given a select-all-that-apply question about the reasons behind their visits to Beacon Food Forest; they could also type an alternative reason if they had a purpose that was not represented. Then, the participants were asked to rank by level of importance all the possible options (*not* just those that they selected in the first question). The five-point Likert ranking scale ranged from "very unimportant" to "very important". Respondents could also choose to opt out of rating any of the options on the provided list.

Visit Purpose	Count	% Important	% Unimportant
Inspiration, peace, or joy	29	54.55%	16.36%
Socialization	22	60.00%	12.73%
Mental health	29	65.45%	9.09%
Physical health	18	64.29%	10.71%
Teaching about the environment	12	45.45%	23.64%
Learning about the environment	9	77.08%	14.58%
Volunteer for the food forest	12	27.27%	27.27%
Recreational activities	20	65.45%	5.45%
Spiritual or religious purposes	7	29.09%	38.18%
Harvesting edibles/medicinals	20	38.18%	20.00%
Harvesting ornamentals/non-medicinals	6	32.73%	25.45%
Collecting seeds	8	36.36%	29.09%
Other	*6*		
No response	*8*		

Table 2. Visit purposes and their relative importance to respondents

The five most frequently selected purposes for visiting were: to improve mental health, inspiration/peace/joy, to socialize with friends or acquaintances, to harvest edible or medicinal plants, and for recreation. The "other" purposes, typed in by respondents, concerned meeting new people or walking through the food forest, either as part of a routine or to access other spaces in Jefferson Park. The five uses deemed somewhat or very personally important by over two-thirds of the respondent pool were: learning about natural environments and ecosystems, recreation, mental health, socializing with friends or acquaintances, and physical health (see Table 2).

Of the most frequently selected visit reasons, two were also considered somewhat or very personally important to two-thirds or more of respondents: to maintain or improve mental health and for recreational purposes. While the former had few co-occurrences with other visit purposes in the survey data, it co-occurred frequently with the code "[Re]Connecting

with Nature" in the interview data, suggesting a link between the two concepts. This is in line with literature that centers the importance of human-nature interactions for mental health. On the other hand, visiting for recreational purposes co-occurred with several other visit purposes across the qualitative survey data, primarily volunteering, harvesting edible or medicinal plants, and gaining inspiration, peace, or joy. This demonstrates that while recreation is a common visit purpose and considered important by many respondents, what might *constitute* recreation to one person versus another is varied and oftentimes interlinked with other visitation purposes.

Although the harvest of edible or medicinal plants was selected as a reason for visiting the food forest at a similar frequency as recreation, socialization, inspiration, and mental health, results about the personal importance of selected services revealed that being able to harvest food or medicine is not the most common reason for visiting the food forest found somewhat or very important by respondents. Instead, **respondents most frequently ascribed positive importance to visit purposes such as maintaining or improving their mental or physical health, recreation, and education about edible species, ecosystems, and the natural world**. Although fresh produce is a valued goal of the space, the food forest clearly provides benefits beyond the material.

Still, while harvesting edible and medicinal plants may not be the most personally important purpose for visiting BFF, several survey respondents wrote about using the food forest as a place to find "fresh produce year round" (SR16, SR17). One respondent even stated, "I can go there and get everything I need in one place, including all the spices, herbs, and other supplies I need to cook my meals" (SR12). Continuing, this respondent linked their harvesting to connecting with nature and being able to "walk around and see the plants growing and see how they're doing" (SR12). Corroborating this, survey free-response data indicated

several co-occurrences of edible or medicinal harvest with those visit purposes rated somewhat or very personally important by most survey respondents. For example, it co-occurred four times with recreation and two times with learning about plants and ecosystems, suggesting that harvesting may play more of a supporting role in the multifaceted nature of experiences had in BFF.

Like the harvesting of edible and medicinal plants, socializing was a frequent visitation reason but was not one of the visit purposes most commonly rated as somewhat or very personally important to respondents. Survey participants noted that the food forest facilitates chance meetings between like-minded individuals, as well as a feeling of being in community with their neighbors based on shared values and working collectively for something bigger than themselves. Additionally, within the qualitative survey data, socializing or building community co-occurred with seven other reasons for visiting the food forest, implying that socialization serves a similar broad supporting role as harvesting with regard to food forest user interactions. Stated otherwise, food forest users may socialize while engaged in activities they gauge as more important or view as their primary visitation purpose, like recreation. Still, given the vast amount of research on nature-based social capital, this finding lends legitimacy to the notion that food forests can help strengthen local community networks.

Moreover, one of the only visit purposes considered somewhat or very personally important by over two-thirds of the respondent pool—but not among the most commonly occurring—was learning about natural environments and ecosystems. However, this theme of environmental education occurred frequently in the survey free-response question answers, most often associated with reconnecting with nature, personal fulfillment, socializing or building community, volunteering, increased participation, recreation, and harvesting food or medicine. It

is possible that part of its importance to participants is its co-occurrence with more common visit purposes, which would suggest that BFF facilitates learning about plants, ecosystems, and the environment through many different means, ranging from individual to social contexts and from recreational to practical purposes. Since educational efficacy is promoted through direct experience and assignments of personal significance, education's co-occurrence with other services indicates that it is nonetheless relatively common and likely contributes to the development of place attachment.

Provision of Services of Value to Self, the Community, or the Land

Parallel with the questions addressed in the previous section, participants were asked two questions relating to the food forest's provided services; in this set, they were asked to consider the services' value not only for them personally but also for the wider community or the land itself. As such, respondents were allowed to select all services they believe BFF provides them, the community, or the land. Respondents were also asked to rank the same set of services by how important they perceived the provision of each service to be to themself, the community, and the land (see Table 3).

Service	Count	% Important	% Unimportant
Inspiration, peace, joy	35	46.43%	12.50%
Spiritual/religious value	20	35.71%	23.21%
Mental/physical health	10	61.90%	9.52%
Recreation	30	57.14%	5.36%
Social connection	29	53.57%	5.36%
Cultural expression	16	57.14%	17.86%
Environmental education	33	57.14%	16.07%
Medicinal	29	48.21%	16.07%
Food	29	58.93%	12.50%
Non-medicinal	19	39.29%	14.29%
Seeds/cuttings	21	50.00%	7.14%
Ecosystem supports	23	57.14%	21.43%
Wildlife habitat	25	57.14%	5.36%
Pest regulation	8	35.71%	14.29%
Climate mitigation	18	60.71%	7.14%
Water regulation	21	53.57%	5.36%
Water purification	11	46.43%	7.14%
Air quality/noise pollution	8	44.64%	12.50%
No response	8		

Table 3. Services provided by BFF and their relative importance to survey respondents

The most common services that respondents thought BFF provides were to gain inspiration, peace or joy; environmental education; recreation; social connection; and edible or medicinal plant products. These are largely in line with responses to the question regarding visit purpose. While improving mental or physical health had a low selection rate in comparison with the most commonly chosen services, this is likely because it was added as an option in the second iteration of the survey. Of the 21 people who took the second iteration, 61.90% of respondents rated it as somewhat or very important, whereas only 9.52% rated it as unimportant.

When ranking the perceived importance of uses or benefits associated with the food forest in relation to the self, community and/or land, the only options which were considered somewhat or very important by a near-two thirds majority were mental/physical health (61.90%, *n*=21) and mitigating the effects of climate change

(60.71%). However, an average of 17.86% of respondents did not rank any given service included in the community value question, meaning that this data may not be representative of the full sample of individuals.

That being said, the presence of mental/physical health as an important service provided by the food forest serves to reinforce the results of the prior survey questions, for which mental health was consistently one of the benefits most commonly selected or rated somewhat/very important to respondents. In addition, it aligns with the literature regarding the mental and physical health benefits of green space, but specifically in the context of a public urban community food forest. The other services most commonly regarded as having positive importance were the harvest of food; ecosystem supports; wildlife habitat; environmental education; expression of cultural heritage; and recreation, which all had selection rates between 57 and 59%. The overall responses to this question are similar to those for the prior question that asked participants to rank visit purposes by relative personal importance. Additionally, a majority of respondents identified mitigation of effects of climate change as an important aspect of what the food forest provides for them, the community, and the land.

Given the marked difference between what services people selected BFF as providing and what services they thought were somewhat/very important, it is possible that the services identified as provided by BFF are not those which users would consider most important for it to provide. Interesting as well is the over-estimation of how important harvesting edible and medicinal plants is for people; significantly more participants responded that it was a somewhat or very important provided service in general (48-58%) than those who considered it a somewhat or very important personal reason to visit Beacon (38%). While these questions are somewhat

different in meaning from one another, it still speaks to an interesting dichotomy between what is believed to be provided by the food forest versus what people actually use it for.

Opinions and Critique of BFF

Survey respondents were also asked to rate the relatability of statements about how they feel about BFF on a five-point scale from very relatable to very unrelatable to judge the level of place attachment formed by respondents towards BFF. **Of the eight statements presented, none were rated less than 50% "somewhat or very relatable" to respondents**. The highest positive response rates were for the statements: "I enjoy visiting Beacon Food Forest" (62.5%), "Beacon Food Forest provides benefits that other outdoor space near me do not" (62.5%), "I find Beacon Food Forest accessible" (60.71%), and "I think of Beacon Food Forest as a community space" (60.71%). Respondents said that they value the food forest because it provides space to grow food for those without yards or a community garden plot (SR35), gives them a sense of community and purpose (SR19), and has changed how they think about food systems and human impacts on the ecosystems in which we live (SR13, SR14, SR16). Overall, based on these results and those mentioned in previous sections, the participants in this study have developed varying degrees of place attachment toward the food forest, yet positively value its place in their neighborhood community.

Interestingly, though, the highest negative response rates (somewhat or very unrelatable) were for the statements: "I feel comfortable visiting BFF" (17.86% of responses) and "I find Beacon Food Forest accessible (12.5% of responses). While these account for a small proportion of respondents, they are striking to consider within the context of two divergent critiques leveled by participants. SR34 said that "Its benefits are overblown and very distant from the historic populations being pushed out of Beacon Hill by gentrification". On the other hand, SR30 said

"The racially segregated bipoc garden is something I don't approve of. Nature and gardening is for everyone. Racially segregating public spaces is atrocious, unneeded, and divisive. My opinion of beacon food forest changed to negative after seeing they did that". This shows that there is **not** widespread consensus as to the overall benefits of the food forest and that it is not a universally loved space, though for differing reasons. Currently, there is an unmet need regarding conversations about race, cultural heritage, and the role of the food forest within the surrounding community. Unresolved tensions and disagreements about how to handle the multifaceted issues Beacon Hill residents are confronting—gentrification in particular—potentially undermine BFF's aims.

Interview Results and Analysis

In addition to qualitative data gathered from free-response survey questions, four users of BFF opted to complete an interview that probed deeper into the nature of their connections with the food forest. Given the small number of interviewees, this data is not representative of the entire sample nor generalizable to larger or other populations (see Table 4), yet it still provides important insights into user relationships with the food forest.

Respondent ID	Age	Gender	Race	Education	Income	Zip Code
SR48/INTVW1	Over 65	Female	White	Master's degree	$40,000-$54,999	98144
SR46/INTVW2	35-44	Female	White	Master's degree	Over $100,000	98108
SR43/INTVW3	55-65	Non-binary/third gender	White	Bachelor's degree	$40,000-$54,999	98144
SR55/INTW4	25-34	Non-binary/third gender	South Asian	Bachelor's dgree	$40,000-$54,999	98105

Table 4. Demographics of interviewees

Interviewees identified as female or nonbinary and ranged widely in age, though were majority white. All four were highly educated, holding either a bachelor's or master's degree, and three-quarters of them had a household income between $40,000 and $54,999. Although one interviewee had recently moved, they had previous experience with BFF and as such, all provided ZIP Codes within the city of Seattle; three lived in ZIP Codes adjacent to Jefferson Park and BFF while the fourth provided a ZIP Code for elsewhere in the city.

Twenty-four codes were found across the four interviews, the most frequently occurring of which can be found in Table 5. Due to the small number of excerpts in the interview dataset, none of these codes had more than three co-occurrences with other codes. Nonetheless, some notable patterns and common themes did arise.

Code	Description	# of occurrences
Connecting with People or Building Community	Mentions of being brought by others or bringing friends to the food forest, developing friendships, talking with others at the food forest, community building, or feelings of connections to a group or individual which are facilitated by the food forest	17
Inspiration/Peace/Joy	Mentions of deriving emotional or other intangible benefits from the food forest, particularly inspiration, peace, or joy	11
Barrier to Participation	Mentions of perceived or potential barriers to participating or engaging with the food forest	11
Learning about Plants/Ecosystems	Mentions of learning about plant species, the edible or medicinal uses of plants, ecosystems, climate, or other environmental topics	10
Harvests Food or Medicine	Mentions of personally harvesting edible or medicinal plant materials from the food forest	9
Unique/Unusual Aspects of BFF	Mentions of physical or experiential aspects of the food forest which participants found unique, unusual, or otherwise out of the ordinary in comparison to other spaces	8

Table 5. Most common codes found across interviews

Connecting with people or building community was the most common theme that emerged across the four interviews, as well as the one that co-occurred most often with other codes, nine of which it co-occurred with two or more times. This suggests that the food forest facilitates social connections through an assortment of means. The greatest number of co-occurrences were with volunteering as well as with learning about nature and ecosystems. Three of the interviewees explicitly linked their knowledge of the plants in BFF to interacting socially with volunteers at the site, and two of them described passing on this knowledge to others in turn and the joy that doing so brought them. Interviewee 4 spoke about introducing people to species in the food forest, saying:

> I would get really excited, and sometimes more excited than they were. And to me, it blew my mind. Because I'm like, this is free. Nothing else is free. (…) And so, I just wanted to share the inspiration that I got from the food forest and pass that on, because I feel almost like that's my duty in receiving from the food forest. And like getting that wonder, I want to spread that to other people.

Interviewees also found learning about plants and ecosystems through engagement with the food forest inspiring, demonstrating a connection between environmental education and feeling inspiration, peace, or joy. For instance, some food forest users or passersby may draw inspiration from the site's plants for their home gardens, learning about what types of plants grow well in the area and with which other species. Interviewee 1 said that she knows "people who have decided what they will put in their yards (…) when they see that garden down in the food forest," and that she herself engages in this practice.

While inspiration, peace, and joy are drawn from the food forest for practical reasons, as shown above, interviewees also experienced these emotions in conjunction with a sense of [re]connection with the natural world outside of the provision of material goods. Two

interviewees used language that implied a reciprocal relationship between them and the food forest, in which they receive the benefits of the food, medicine, and other provided resources and give back in the form of weeding, planting, and reseeding the species they harvest from. A third interviewee expressed that the "semi-wild semi-cultured growth of the food forest" (SR46/INTVW 2) feels distinctly different and more appealing than other outdoor or 'nature' spaces near her. Expressing a similar sentiment, Interviewee 4 said that even when visiting Seattle's large, forested parks, they feel "separate from [nature], (…) like you're visiting (…) but you are not integrated into it," a sentiment echoing the historical development of green space and how food forests can combat the disconnect urban dwellers tend to have with nature at large and food systems in particular.

In addition to the inspiration interviewees linked with [re]connecting with the natural world, all four mentioned maintaining or improving their mental health in relation to the reconnection facilitated by the food forest. The interviewees emphasized the uniqueness of the form and function of the species at the site and the overall relaxation and joy they feel when engaging with them, providing additional evidence for research on the benefits of greenspace on mental health. Other aspects that the interviewees linked to maintaining or improving their mental health were the social and community connections made through the food forest as well as the comfort of having ready access to plant life and free food, medicine, seeds, and other resources.

Indeed, the public, open-harvest nature of BFF was a much-appreciated aspect that interviewees noted as being unique to the site. All the interviewees praised the concept of having a place where food is grown and distributed communally and two of them had personal experience using the food forest to forage for edible and medicinal plants. In particular,

Interviewee 4 said that they found the opportunity to harvest from the food forest uniquely beneficial for two main reasons. First, in the food forest you can find many herbs in one place rather than having to walk to several parts of the neighborhood to find them in public rights-of-way. Second, for Interviewee 4—who indicated that they would forage for herbs regardless of whether they were located in the food forest or in informal public commons (e.g., sidewalks, parking strips, alleys)—doing so at the food forest feels safer and more comfortable. Unlike other commons, where people might look at you with suspicion for harvesting products from trees hanging out of someone's yard or plants growing on spare patches of soil, or public parks where foraging is very often illegal and has the potential to be met with a fine or other punishment, the food forest is explicitly designated for such activities and has space dedicated for the public to forage safely.

On the other hand, the interviewees did note that while the food forest is a loved and well-utilized resource for some of them, there are certain barriers to engaging with the site that might be hindering wider community use of the food forest. The most consistently mentioned was that the knowledge of edible or medicinal plants and how to harvest and prepare them is not necessarily widespread. As such, it can be hard for folks to know how to interact with or use the food forest safely. This barrier to participation is also noted in the literature; for instance, in a study of foraging among Black people living near an Atlanta food forest, "for those who had never collected...lack of knowledge about the location of resources was the primary constraint, followed by no interest, not knowing how to forage, and worries about picking either poisonous or chemically contaminated foods" (Johnson Gaither et al. 2020, 6).

Recommendations

For Beacon Food Forest

Throughout the survey free-responses and interviews, participants brought up a desire to have more clear, consistent, and informative signage at the food forest, noting that an unfamiliarity with identifying and safely using edible or medicinal plant species was a perceived barrier to participation with Beacon Food Forest. One interviewee suggested individual plant signs that include "a little bit about what [the plant is], the actual name, the scientific name, and any [edible or medicinal] properties or when it's in season" (SR55/INTVW 4). New signage is a project that volunteers with the food forest have been actively working on and is being implemented as of late March 2023. Still, other participants mentioned a need for more explicit and frequent signage at the various entrances and paths throughout the food forest regarding which areas are open to free-harvest versus not. Given how unusual the site is in its form and function, efforts to familiarize people with the plants within the food forest could promote use among those populations who are curious but lack the knowledge to engage with the site.

In addition to better signage for individual species, participants also identified that more formalized learning opportunities such as weekly classes could be taught; potential topics include how to identify different edible plants in the food forest and how one might utilize them as food or medicine, as well as more general information about native Seattle flora. This could contribute to people being more easily able to engage with and utilize the resources within Beacon Food Forest. In addition to actively fostering a welcoming learning environment, such opportunities would also enable increased dialogue with community members about the Forest's role in honoring and uplifting the racial and ethnic groups that have long resided in Beacon Hill, which participants recognized as a potential area of improvement for the organization.

For Municipalities

Throughout the survey and interview data, several participants specifically mentioned the food forest's location—adjacent to a large public park with other community resources—as a specific positive aspect of the project. Parks and other green spaces already in public ownership pose as optimal spaces for cities to establish new public community food forests. One example of this method is the Wetherby Edible Forest in Iowa City, Iowa. Established between 2014-2015, the food forest is entirely public and open for harvesting and foraging by passersby and is situated in Wetherby Park, adjacent to the playground. This food forest is sponsored by both public departments (Parks and Recreation of Iowa City and the Iowa Department of Agriculture) as well as private partners and is upkept by a wide array of local volunteers ("Wetherby Edible Forest | Learn, Grow, Harvest and Celebrate" n.d.). Cities curious about the potential benefits that food forests could bring to their citizens and urban ecosystem overall should consider partnering with local communities to pilot public urban community food forest projects on public lands. This would eliminate economic barriers to participation often experienced with community garden sites and make the experience of urban foraging or harvesting of plants safer and more enjoyable for a greater number of individuals.

Additionally, should a city opt to create a public urban community food forest, they should center the surrounding communities of people in the imagining and execution of the food forest so that it meets their unique needs and desires as much as possible. Designating funding to pay a local community member to manage the food forest could further entrench the community in the space and ensure that the direction of the food forest's development lays in the hands of those living in the area. If there are not resources and sufficient community investment in creating a food forest in a city/town, governments should consider entirely legalizing the harvest

of edible and medicinal plants on rights-of-way and public commons, including public parks, given the feedback from two interviewees about the food forest providing a *safe* and *legal* means for foraging, as well as the fact that foraging in public parks and on other public land is illegal in most cities and towns across the United States and can lead to individuals being harassed or penalized for these activities (Linnekin 2018).

Limitations

The execution of this research had several limiting factors. Primarily, the data set used is far too small to generalize results. Even with the exploratory nature of this study, the sample size is small enough that the results may not encompass all the uses of BFF, their relative importance, or the perceived services provided. Additionally, despite efforts to root out AI responses, there is the possibility that some were sophisticated enough to have not been eliminated by the exclusion guidelines created. This raises questions about the validity of the final dataset. Another potential issue with the sample is bias toward positive opinions about BFF, as people who view the site in a positive light are more likely to have seen the survey and decided to take it.

Due to constraints in time and resources, this study was conducted in English only. This was likely a limiting factor in how many users were able to participate in the survey as well as the demographic diversity of those participants. The monolingual nature of this survey means that those with low or no English language skills are likely underrepresented in the survey data. This is relevant as the neighborhoods surrounding Beacon Food Forest have high levels of linguistic diversity as well as a high proportion of adults with poor English language ability (City of Seattle n.d.).

Conclusion

This study, while small and largely exploratory, has revealed that users of Beacon Food Forest in Seattle, WA experience it as a space that furnishes a multitude of both tangible and intangible uses and benefits to themselves and their community. Primarily, the forest provides opportunities for social connection and community building, the ability to safely harvest free edible and medicinal plant products, the evocation of positive emotions such as inspiration, peace, or joy, and the maintenance or improvement of mental health. While harvesting of food or medicine occurs mostly on a supplemental basis, the food forest provides a safe and legal space for urban residents to forage, which is explicitly appreciated by several participants, and to connect with their community. Additionally, the results show that there are many uses and benefits of the food forest that are experienced in tandem with each other, suggesting the presence of a web of interconnected services, rather than isolated uses and benefits that do not cross intrinsic and instrumental boundaries. The results of this study will be valuable to stakeholders and decision makers who now have information on how the BFF site is being utilized and which aspects of it are most highly valued by users and community members, as well as community critiques of the site.

Appendix A

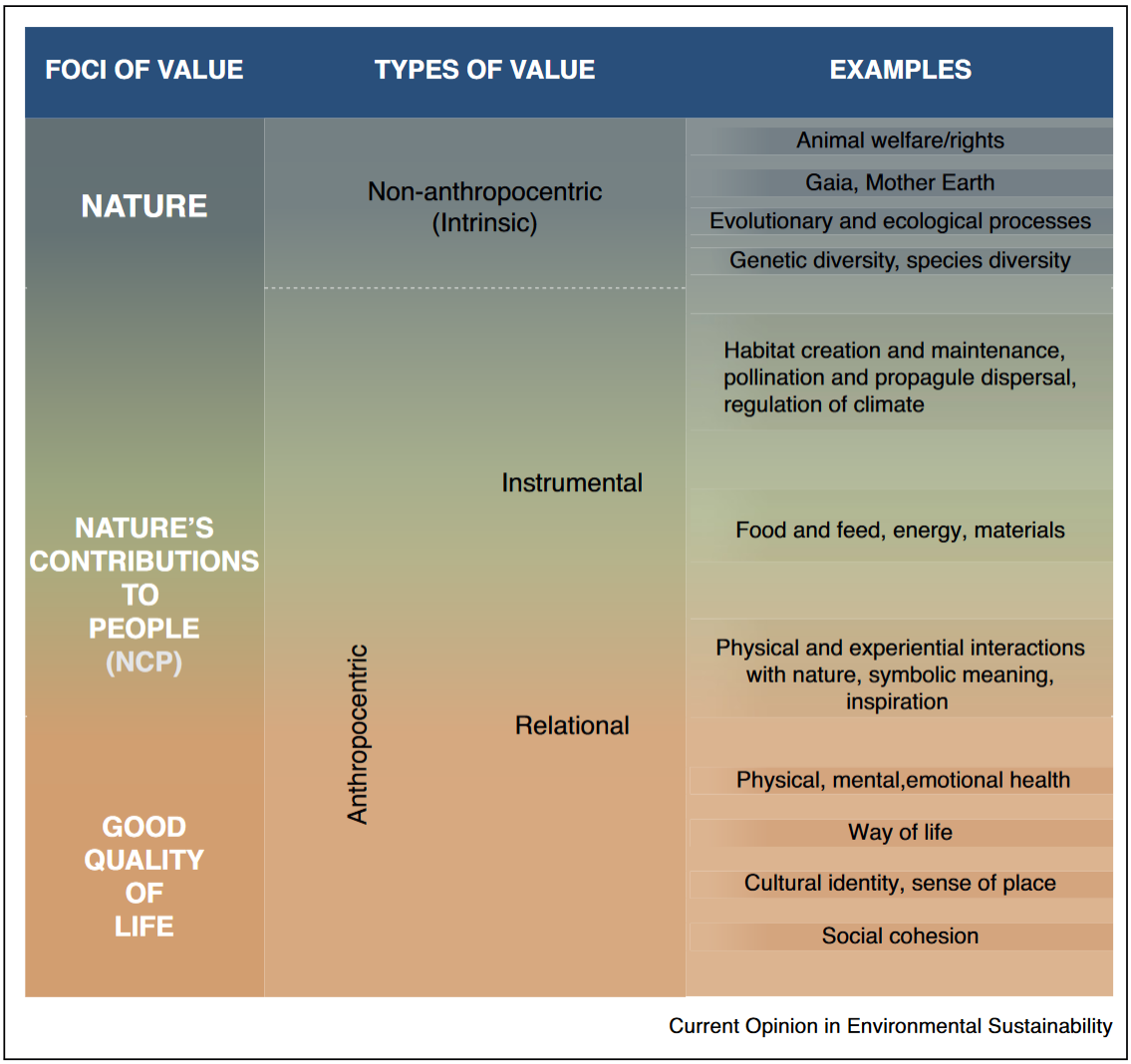
Millennium Ecosystem Assessment Framework for Ecosystem Services

Cultural Services (CS)	❖ *Cultural Heritage* ❖ *Environmental education* ❖ *Inspiration* ❖ *Recreation* ❖ *Sense of place* ❖ *Social connection* ❖ *Spiritual or religious*
Provisionary Services (PS)	❖ *Food products* ❖ *Fresh water* ❖ *Genetic information* ❖ *Medicinals* ❖ *Non-food products*
Regulating Services (RS)	❖ *Habitat* ❖ *Improved air quality* ❖ *Mitigating climate change* ❖ *Pest regulation* ❖ *Water purification* ❖ *Water regulation (flooding, runoff, erosion)*
Supporting Services (SS)	❖ *Nutrient cycling* ❖ *Photosynthesis* ❖ *Soil formation* ❖ *Water cycling*

Table and contents adapted from *Ecosystems and Human Well-Being: A Framework For Assessment*, page 57

Appendix B

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services Framework for Ecosystem Services



Appendix C

Survey Questions, Version One

Q1 OCCIDENTAL COLLEGE SURVEY INFORMED CONSENT FORM

Title of Study: Measuring Services, Benefits, and Value Provided by Food Forest Systems to Surrounding Communities

Student Investigator: Irene Wickwire

Faculty Supervisor: Bhavna Shamasunder

You are invited to participate in a research study conducted by Irene Wickwire, a student at Occidental College in Los Angeles, CA. You must be at least 18 years of age to consent to participation in this study. Please read this form and ask any questions you may have before agreeing to be in the study.

PURPOSE OF STUDY: The purpose of this study is to measure the benefits, services, and value derived from Beacon Food Forest in Seattle, Washington by users, as well as to map the distribution of BFF users. The survey seeks to understand the relative significance of these benefits as well as whether these services and benefits differ from those derived from other outdoor spaces frequented by participants. Final analysis of data collected from this study will be used for a Senior Comprehensive Project at Occidental College, which will be published online on the Urban & Environmental Policy department webpage. Data collected will only be used for the above project. All data will be secured with password-protection during collection and analysis. It will also be kept under lock and key in hard copy format by my academic advisor, Bhavna Shamasunder, for a period of at least three years after the completion of this project.

PROCEDURES: The estimated length of time required to complete this survey is 10 to 15 minutes. It can be completed using a computer or mobile phone. If you agree to take part in this study, you will be asked to identify your neighborhood of residence, answer multiple choice questions about how frequently you visit Beacon Food Forest, how you interact with the site, and what services or benefits you and your neighborhood community derive from Beacon Food Forest. You will also be asked to rate the importance of each of these services and benefits. Finally, I ask you to rate an assortment of personal statements relating to Beacon Food. Space for additional questions, comments, and concerns will be provided at the end of the survey to allow participants to add information which they believe was not addressed by the survey questions.

VOLUNTARY PARTICIPATION: Participation in this study is voluntary. After affirming your consent and responding to the following question, you may skip any questions that you do not want to answer. You may stop participating at any time. You are free to withdraw from the study at any time without penalty, with no loss of benefits to which you were otherwise entitled.

RISKS and BENEFITS: There are no anticipated risks or discomfort associated with your participation in this survey other than those experienced through daily life. Although you may not benefit directly from this research, by participating in this survey you are helping advance the understanding of the impact which food forest systems have on the people living near to them. This work will contribute to an emerging body of research which attempts to characterize interactions between urban residents and food forests.

CONFIDENTIALITY: Participant responses will be anonymous. At the end of the survey, you will be asked whether you have interest in further participation, and if so, to provide an email address that you can be contacted at. You will be asked about your age, income, gender, and race. However, all demographic questions are optional, and participants may elect not to answer one or all questions in this section. All data collected over the course of the survey period will be kept password protected and on the researcher's computer. After completion of this project, all data collected will be deleted from the researcher's computer and hard copies will be locked and stored in the office of the researcher's academic advisor, Bhavna Shamasunder, for a period of at least three years. This data will not be used in any other research project, nor will it be combined with other datasets in any manner.

CONTACT INFORMATION: If you have any questions or concerns about the research, you can contact Irene Wickwire at iwickwire@oxy.edu or Professor Bhavna Shamasunder at bhavna@oxy.edu. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board Office at Occidental College in Los Angeles, CA, 90041 at hsrrc@oxy.edu.

CONSENT STATEMENT I am at least eighteen years of age. I have read this form and the research study has been explained to me. I am fully aware of the nature and extent of my participation in this research project and the possible risks as outlined above. I understand that I may withdraw my participation in this project at any time without prejudice or penalty of any kind. I hereby agree to participate in this research project.

- ○ Yes, I consent (1)
- ○ No, I do not consent (2)

Q2 What is your five number zip code?

_____

Q3 What is the name of the neighborhood you live in?

_____

Q4 How old are you?

- ○ 18-24 (1)
- ○ 25-34 (2)
- ○ 35-44 (3)
- ○ 45-54 (4)
- ○ 55-65 (5)
- ○ Over 65 (6)
- ○ Prefer not to answer (7)

Q5 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary / third gender (3)
- ○ Prefer not to answer (4)
- ○ Other (please describe): (5)

_____

Q6 What is your race/ethnicity? (select all that apply)

- ☐ Latinx origin (any race) (1)
- ☐ Indigenous (American Indian, Alaskan Native, Native Hawaiian, etc.) (2)

- [ ] Pacific Islander (3)
- [ ] East Asian (4)
- [ ] Southeast Asian (5)
- [ ] South Asian (6)
- [ ] Black (7)
- [ ] North African (8)
- [ ] Sub-Saharan African (9)
- [ ] Middle Eastern (10)
- [ ] Multiracial, Mixed, or Mestizo (11)
- [ ] White (12)
- [ ] Prefer not to answer (13)
- [ ] Other (please describe): (14) _____

Q7 What best describes your household income last year?

- ○ Less than $25,000 (1)
- ○ $25,000-$39,999 (2)
- ○ $40,000-$54,999 (3)
- ○ $55,000-$69,999 (4)
- ○ $70,000-$84,999 (5)
- ○ $85,000-$100,000 (6)
- ○ Over $100,000 (7)
- ○ Prefer not to answer (8)

Q8 What best describes your level of education?

- ○ No schooling (1)
- ○ Grades 1-8 (primary and middle school) (2)
- ○ High school (no diploma or equivalent) (3)
- ○ High school diploma or equivalent (4)
- ○ Some college, no degree (5)
- ○ Associates degree (ex. AA, AS) (6)
- ○ Bachelor's degree (ex. BA, BS) (7)
- ○ Some trade school (8)
- ○ Trade school graduate (9)
- ○ Master's degree (ex. MA, MS, MEng, MEd, etc.) (10)
- ○ Professional degree beyond bachelor's (ex. MD, DDS, DVM, etc.) (11)
- ○ Doctorate degree (ex. PhD, EdD, etc.) (12)

Q9 How would you describe your involvement with Beacon Food Forest?

- ○ I have never been to Beacon Food Forest (1)
- ○ I have only visited once or twice (2)
- ○ I visit the food forest infrequently, a few times per year (3)
- ○ I visit the food forest consistently throughout the year but I do not volunteer and I am not involved with programs (4)
- ○ I visit the food forest consistently throughout the year and I am involved with volunteering or programs (5)
- ○ I visit the food forest often throughout the year but I do not volunteer and I am not involved with programs (6)
- ○ I visit the food forest often throughout the year and I am involved with volunteering or programs (7)

○ I am highly involved in the organization and/or facilitation of volunteering or programs at the food forest (8)

Q10 How many times per month do you visit Beacon Food Forest for any reason?

(3 (9 1 1 1 2 2 2 3
2 6 9 2 5 8 1

Number of visits per month ()	

Q11 For how many years have you been involved with Beacon Food Forest in any capacity?

○ <1 (1)

○ 1-2 years (2)

○ 2-3 years (3)

○ 3-4 years (4)

○ 4-5 years (5)

○ 5-6 years (6)

○ 6-7 years (7)

○ 7-8 years (8)

○ 8-9 years (9)

○ 10-11 years (10)

○ 11-12 years (11)

Q12 How would you describe your involvement with Beacon Food Forest?

_____

_____

_____

_____

_____

Q13 Has your involvement with Beacon Food Forest increased, decreased, or changed in nature over the period of time that you have been involved? If comfortable, please explain:

_____

_____

_____

_____

_____

Q14 For what purpose do you visit Beacon Food Forest? (select all that apply)

- ☐ to learn about the natural environment and ecosystems (1)
- ☐ to teach about the natural environment and ecosystems (2)
- ☐ to gain inspiration (3)
- ☐ to engage in recreational activities such as walking or playing with pets and children (4)
- ☐ to socialize with friends or acquaintances (5)
- ☐ for spiritual or religious purposes (6)
- ☐ to harvest edible or medicinal plant products (7)
- ☐ to harvest non-medicinal or inedible plant products (8)
- ☐ to gather seeds of plant species (9)
- ☐ to volunteer on behalf of the food forest (10)
- ☐ to improve mental health (11)

- [ ] to improve physical health (12)
- [ ] Other (please explain): (13)

_____

Q15 How important are these uses to you personally? Please rate on a scale from **very unimportant** to **very important**

	Very unimportant (1)	Somewhat unimportant (2)	Neutral/Unsure (3)	Somewhat important (4)	Very important (5)
To learn about the natural environment and ecosystems (1)	○	○	○	○	○
To teach about the natural environment and ecosystems (2)	○	○	○	○	○
To gain inspiration (3)	○	○	○	○	○
To engage in recreational activities such as walking with pets or children (4)	○	○	○	○	○

To socialize with friends or acquaintances (5)				
For spiritual or religious purposes (6)				
To harvest edible or medicinal plant products (7)				
To harvest non-medicinal or inedible plant products (8)				
To gather seeds of plant species (9)				
To volunteer on behalf of the food forest (10)				

To improve mental health (11)				
To improve physical health (12)				
If you selected "Other", please rate using this line (13)				

Q16 Please select all services which you believe Beacon Food Forest provides to you, the local community, or the land

- Expression of cultural heritage (1)
- Environmental education (2)
- Inspiration (3)
- Recreation (4)
- Social connection (5)
- Spiritual or religious value (6)
- Food products (7)
- Medicinal products (8)
- Non-medicinal or inedible plant products (9)
- Seeds or cuttings of plants (10)
- Wildlife habitat (11)

- [ ] Improved air quality (12)
- [ ] Pest regulation (13)
- [ ] Mitigates effects of climate change (air, soil, and water pollution, urban heat island effect, etc.) (14)
- [ ] Water regulation (flood, run off, and erosion control) (15)
- [ ] Water purification (16)
- [ ] Ecosystem supports (water and nutrient cycles, photosynthesis, soil formation) (17)

Q17 Please rate the services which you believe Beacon Food Forest provides you, the local community, or the land, on a scale from **very unimportant** to **very important**

	Very unimportant (1)	Somewhat unimportant (2)	Neutral/Unsure (3)	Somewhat important (4)	Very important (5)
Expression of cultural heritage (1)	○	○	○	○	○
Environmental education (2)	○	○	○	○	○
Inspiration (3)	○	○	○	○	○
Recreation (4)	○	○	○	○	○
Social connection (5)	○	○	○	○	○
Spiritual or religious value (6)	○	○	○	○	○

Food products (7)	○	○	○
Medicinal products (8)	○	○	○
Non-medicinal or inedible plant products (9)	○	○	○
Seeds or cuttings of plants (10)	○	○	○
Wildlife habitat (11)	○	○	○
Improved air quality (12)	○	○	○
Pest regulation (13)	○	○	○
Mitigates effects of climate change (air, soil, and water pollution, urban heat island effect, etc.) (14)	○	○	○
Water regulation (flood, runoff, and erosion control (15)	○	○	○
Water purification (16)	○	○	○
Ecosystem supports (water, nutrient,	○	○	○

and energy cycles, soil formation) (17)	

Q18 Please rate your agreement with these statements on a scale from **very unrelatable** to **very relatable**

	Very unrelatable (1)	Somewhat unrelatable (2)	Neutral/Unsure (3)	Somewhat relatable (4)	Very relatable (5)
I feel comfortable visiting Beacon Food Forest (1)					
I find Beacon Food Forest accessible (2)					
I enjoy visiting Beacon Food Forest (3)					
I wish I could visit Beacon Food Forest more often (4)					
Beacon Food Forest					

provides benefits that other outdoor spaces near me do not (5)				
I use Beacon Food Forest in ways that I cannot use other outdoor spaces near me (6)	○	○	○	
I think of Beacon Food Forest as a community space (7)	○	○	○	
Beacon Food Forest has had a positive impact on my community (8)	○	○	○	

Q19 Do you have additional comments or concerns regarding Beacon Food Forest and how you use and value it? Please explain below:

_____

_____

_____

_____

_____

20 Are you interested in participating in an additional short conversation about your relationship to Beacon Food Forest? If yes, please enter your name and an email address or cell phone number below.

_____

Appendix D

Survey Questions, Version Two

Consent Occidental College Survey Informed Consent Form

Title of Study: Measuring Services, Benefits, and Value Provided by Food Forests to Surrounding Communities

Student Investigator: Irene Wickwire

Faculty Supervisor: Bhavna Shamasunder

You are invited to participate in a research study by Irene Wickwire, a student at Occidental College in Los Angeles, CA. You must be at least 18 years of age to participate in this study. Please read this form and ask any questions you may have before agreeing to be in the study.

PURPOSE OF STUDY: The purpose of this study is to measure the benefits and values which users of Beacon Food Forest associate with it and to document their interactions with it. The survey seeks to understand the significance of these benefits and whether they differ from those derived from other outdoor spaces. Final analysis of data collected from this study will be used for a Senior Comprehensive Project at Occidental College, which will be published online on the Urban & Environmental Policy department webpage.

PROCEDURES: The average length of time required to complete this survey is 10 minutes. It can be completed using a computer or mobile phone. If you agree to take part in this study, you will be asked to identify your neighborhood of residence, answer multiple choice questions about how frequently you visit Beacon Food Forest, how you interact with the site, and what services or benefits you or your neighborhood community derive from Beacon Food Forest. You will also be asked to rate the importance of each of these services and benefits. Finally, you will be asked to rate an assortment of personal statements relating to Beacon Food. Space for additional questions, comments, and concerns will be provided at the end of the survey.

VOLUNTARY PARTICIPATION: Participation in this study is voluntary. After giving your consent and responding to the following question, you may skip any questions that you do not want to answer. You may stop participating at any time without penalty, with no loss of benefits to which you were otherwise entitled.

RISKS and BENEFITS: There are no anticipated risks or discomfort associated with your participation in this survey other than those experienced through daily life. Although you may not benefit directly from this research, by participating in this survey you are helping to advance the understanding of the impact that food forest systems have on the people living nearby them. This work will contribute to an emerging body of research studying interactions between urban residents and food forests.

COMPENSATION: The first fifty (50) respondents will be eligible to receive a $10 digital Amazon gift card! Respondents must provide their email address at the end of the survey in order to receive compensation. Gift cards will be sent no more than seven days after the survey was submitted.

CONFIDENTIALITY: Participant responses will be anonymous. At the end of the survey, you will be asked whether you have interest in further participation, and if so, to provide an email address that you can be contacted at. You will be asked about your age, income, gender, and race. However, all demographic questions are optional, and participants may elect not to answer one or all questions in this section. All data collected over the course of the survey period will be kept password protected and on the researcher's computer. After completion of this project, all data collected will be deleted from the researcher's computer and hard copies will be locked and stored in the office of the researcher's academic advisor for at least three years. This data will not be used in any other research project or combined with other datasets in any manner.

CONTACT INFORMATION: If you have any questions or concerns about the research, you can contact Irene Wickwire at iwickwire@oxy.edu or Professor Bhavna Shamasunder at bhavna@oxy.edu. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board Office at Occidental College in Los Angeles, CA, 90041 at hsrrc@oxy.edu.

CONSENT STATEMENT I am at least eighteen years of age. I have read this form and am fully aware of the nature and extent of my participation in this research project and the possible risks as outlined above. I understand that I may withdraw my participation in this project at any time without prejudice or penalty of any kind.

- ○ Yes, I consent (1)
- ○ No, I do not consent (2)

Q1 What is your five number zip code?

_____

Q2 What is the name of the neighborhood you live in?

_____

Q3 How old are you?

- ○ 18-24 (1)
- ○ 25-34 (2)
- ○ 35-44 (3)
- ○ 45-54 (4)
- ○ 55-65 (5)
- ○ Over 65 (6)
- ○ Prefer not to answer (7)

Q4 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary / third gender (3)
- ○ Prefer not to answer (4)
- ○ Other (please describe): (5) _____

Q5 What is your race/ethnicity? (select all that apply)

- ☐ Latinx origin (any race) (1)
- ☐ Indigenous (American Indian, Alaskan Native, Native Hawaiian, etc.) (2)
- ☐ Pacific Islander (3)
- ☐ East Asian (4)
- ☐ Southeast Asian (5)
- ☐ South Asian (6)
- ☐ Black (7)
- ☐ North African (8)

- [ ] Sub-Saharan African (9)
- [ ] Middle Eastern (10)
- [ ] White (12)
- [ ] Prefer not to answer (13)
- [ ] Other (please describe): (14)

_____

Q6 What language(s) do you speak at home other than english?

_____

Q7 What best describes your household income last year?

- ○ Less than $25,000 (1)
- ○ $25,000-$39,999 (2)
- ○ $40,000-$54,999 (3)
- ○ $55,000-$69,999 (4)
- ○ $70,000-$84,999 (5)
- ○ $85,000-$100,000 (6)
- ○ Over $100,000 (7)
- ○ Prefer not to answer (8)

Q8 What best describes your level of education?

- ○ No schooling (1)
- ○ Grades 1-8 (primary and middle school) (2)
- ○ High school (no diploma or equivalent) (3)

- ○ High school diploma or equivalent (4)
- ○ Some college, no degree (5)
- ○ Associates degree (ex. AA, AS) (6)
- ○ Bachelor's degree (ex. BA, BS) (7)
- ○ Some trade school (8)
- ○ Trade school graduate (9)
- ○ Master's degree (ex. MA, MS, MEng, MEd, etc.) (10)
- ○ Professional degree beyond bachelor's (ex. MD, DDS, DVM, etc.) (11)
- ○ Doctorate degree (ex. PhD, EdD, etc.) (12)

Q9 How would you describe your experience with Beacon Food Forest?

- ○ I have never been to Beacon Food Forest (1)
- ○ I have visited once or twice (2)
- ○ I visit the food forest infrequently, a few times per year (3)
- ○ I visit the food forest consistently throughout the year but I do not volunteer and I am not involved with programs (4)
- ○ I visit the food forest consistently throughout the year and I am involved with volunteering or programs (5)
- ○ I visit the food forest often throughout the year but I do not volunteer and I am not involved with programs (6)
- ○ I visit the food forest often throughout the year and I am involved with volunteering or programs (7)
- ○ I am highly involved in the organization and/or facilitation of volunteering or programs at the food forest (8)

Q10 How many times per month do you visit Beacon Food Forest for any reason?

_____

Q11 How many times per month do you gather food from Beacon Food Forest for yourself, your family, or your neighbors?

_____

Q12 How many times per month do you volunteer at Beacon Food Forest?

_____

Q13 For how many years have you been involved with Beacon Food Forest in any capacity?

- ○ Not applicable (1)
- ○ >1 year (12)
- ○ 1-2 years (2)
- ○ 2-3 years (3)
- ○ 3-4 years (4)
- ○ 4-5 years (5)
- ○ 5-6 years (6)
- ○ 6-7 years (7)
- ○ 7-8 years (8)
- ○ 8-9 years (9)
- ○ 10-11 years (10)
- ○ 11-12 years (11)

Q14 How would you describe your involvement with Beacon Food Forest?

_____

_____

_____

_____

_____

Q15 Has your involvement with Beacon Food Forest increased, decreased, or changed in nature over the period of time that you have been involved? If comfortable, please explain:

_____

_____

_____

_____

_____

Q16 For what purpose do you visit Beacon Food Forest? (select all that apply)

- ☐ to learn about the natural environment and ecosystems (1)
- ☐ to teach about the natural environment and ecosystems (2)
- ☐ to gain inspiration, peace, or joy (3)
- ☐ to engage in recreational activities such as walking or playing with pets and children (4)
- ☐ to socialize with friends or acquaintances (5)
- ☐ for spiritual or religious purposes (6)
- ☐ to harvest edible or medicinal plants (7)
- ☐ to harvest non-medicinal or inedible plants (8)
- ☐ to gather seeds of plant species (9)

- [ ] to volunteer on behalf of the food forest (10)
- [ ] to improve mental health (11)
- [ ] to improve physical health (12)
- [ ] Other (please explain): (13) _____

Q17 How important are these uses to you personally? Please rate on a scale from **very unimportant** to **very important**

	Very unimportant (1)	Somewhat unimportant (2)	Neutral/Unsure (3)	Somewhat important (4)	Very important (5)
To learn about the natural environment and ecosystems (1)	○	○	○	○	○
To teach about the natural environment and ecosystems (2)	○	○	○	○	○
To gain inspiration, peace, or joy (3)	○	○	○	○	○
To engage in recreational	○	○	○	○	○

activities such as walking with pets or children (4)				
To socialize with friends or acquaintances (5)				
For spiritual or religious purposes (6)				
To harvest edible or medicinal plants (7)				
To harvest non-medicinal or inedible plants (8)				
To gather seeds of plant species (9)				
To volunteer on behalf of the food forest (10)				

To improve mental health (11)				
To improve physical health (12)				
If you selected "Other", please rate using this line (13)				

Q18 Please select all services which you believe Beacon Food Forest provides to you, the local community, or the land

- Expression of cultural heritage (1)
- Environmental education (2)
- Inspiration, peace, or joy (3)
- Recreation (4)
- Physical or mental health/healing (19)
- Social connection (5)
- Spiritual or religious value (6)
- Culturally specific food or medicine (7)
- Foods (18)
- Medicinal plants (8)

- [ ] Non-medicinal or inedible plants (9)
- [ ] Seeds or cuttings of plants (10)
- [ ] Wildlife habitat (11)
- [ ] Improved air quality or noise level (12)
- [ ] Pest regulation (13)
- [ ] Mitigates effects of climate change (air, soil, and water pollution, urban heat island effect, etc.) (14)
- [ ] Water regulation (flood, run off, and erosion control) (15)
- [ ] Water purification (16)
- [ ] Ecosystem supports (water and nutrient cycles, photosynthesis, soil formation) (17)

Q19 Please select all services which you wish Beacon Food Forest provided to you, the local community, or the land

- [ ] Expression of cultural heritage (1)
- [ ] Environmental education (2)
- [ ] Inspiration, peace, or joy (3)
- [ ] Recreation (4)
- [ ] Physical or mental health/healing (19)
- [ ] Social connection (5)
- [ ] Spiritual or religious value (6)
- [ ] Culturally specific food or medicine (7)
- [ ] Foods (18)
- [ ] Medicinal plants (8)

- [ ] Non-medicinal or inedible plants (9)
- [ ] Seeds or cuttings of plants (10)
- [ ] Wildlife habitat (11)
- [ ] Improved air quality or noise level (12)
- [ ] Pest regulation (13)
- [ ] Mitigates effects of climate change (air, soil, and water pollution, urban heat island effect, etc.) (14)
- [ ] Water regulation (flood, run off, and erosion control) (15)
- [ ] Water purification (16)
- [ ] Ecosystem supports (water and nutrient cycles, photosynthesis, soil formation) (17)

Q20 Please rate the services which you believe Beacon Food Forest provides you, the local community, or the land, on a scale from **very unimportant** to **very important**

	Very unimportant (1)	Somewhat unimportant (2)	Neutral/Unsure (3)	Somewhat important (4)	Very important (5)
Expression of cultural heritage (1)	○	○	○	○	○
Environmental education (2)	○	○	○	○	○
Inspiration, peace, or joy (3)	○	○	○	○	○
Recreation (4)	○	○	○	○	○

Physical or mental heatlh/healing (18)	○	○	○
Social connection (5)	○	○	○
Spiritual or religious value (6)	○	○	○
Culturally specific food or medicine (20)	○	○	○
Food (7)	○	○	○
Medicinal plants (8)	○	○	○
Non-medicinal or inedible plants (9)	○	○	○
Seeds or cuttings of plants (10)	○	○	○
Wildlife habitat (11)	○	○	○
Improved air quality or noise level (12)	○	○	○
Pest regulation (13)	○	○	○
Mitigates effects of climate change (air, soil, and water	○	○	○

pollution, urban heat island effect, etc.) (14)					
Water regulation (flood, runoff, and erosion control (15)	○	○	○		
Water purification (16)	○	○	○		
Ecosystem supports (water, nutrient, and energy cycles, soil formation) (17)	○	○	○		

Q21 Please rate your agreement with these statements on a scale from **very unrelatable** to **very relatable**

	Very unrelatable (1)	Somewhat unrelatable (2)	Neutral/Unsure (3)	Somewhat relatable (4)	Very relatable (5)
I feel comfortable visiting Beacon		○	○	○	

Food Forest (1)					
I find Beacon Food Forest accessible (2)	○	○	○		
I enjoy visiting Beacon Food Forest (3)	○	○	○		
I wish I could visit Beacon Food Forest more often (4)	○	○	○		
Beacon Food Forest provides benefits that other outdoor spaces near me do not (5)	○	○	○		
I use Beacon Food Forest in ways that I cannot use other outdoor	○	○	○		

spaces near me (6)					
I think of Beacon Food Forest as a community space (7)	○	○	○		
Beacon Food Forest has had a positive impact on my community (8)	○	○	○		

Q22 Do you have additional comments or concerns regarding Beacon Food Forest and how you use or value it? Please explain below:

_____

_____

_____

_____

_____

Q23 Are you interested in participating in an additional short conversation about your relationship to Beacon Food Forest? If yes, please enter your name and an email address or cell phone number below.

_____

Q24 In order to be eligible for compensation, please enter your email address here

_____

Appendix E

Beacon Food Forest User Interview Protocol & Questions

[Ask if they are willing to be recorded, act accordingly]

Hello, thank you for agreeing to participate in an interview. The interview will cover your experience with the Beacon Food Forest (BFF) and why you interact with it. Have you read the informed consent document for this interview, and do you consent to participate? You are free to stop at any time. Let's get started.

1. How and when did you first learn about Beacon Food Forest?
2. How long have you been visiting/using Beacon Food Forest?
3. What level of involvement would you describe yourself as having with Beacon Food Forest?
    1. [if infrequent/rare] Are there any reasons why you do not visit or involve yourself with Beacon Food Forest more often?
4. Why do you visit Beacon Food Forest?
    1. What are the most important uses to you personally and why?
    2. What are the least important uses to you personally and why?
    3. [ask about any particularly interesting survey response]
5. Do you usually visit Beacon Food Forest alone or with others?
    1. [If others, ask] Who do you usually visit with?
6. Have you ever felt uncomfortable going to Beacon Food Forest? Why or why not?
7. What aspect of Beacon Food Forest do you like the most?
8. What aspect of Beacon Food Forest do you dislike the most?
9. [Identify top 3 most important/highest rated services by interviewee during survey] Please explain a little about why [most important services] are important to you.
10. Are there any of the services and benefits the Beacon Food Forest provides which you would not be able to get from another park or green space near you?
11. [If participant lives within 1-1.5 mile radius] Has your involvement with Beacon Food Forest impacted how you perceive community and connection in your neighborhood?
    1. Do you view the food forest as part of your neighborhood's community?
        1. Why or why not?

Appendix F

Survey Submission Exclusion Criteria

1. Two or more survey responses start *and* end within the same three minute span
2. Two or more survey responses start *or* end within the same three minute span *and* one or more other exclusion criteria are met
3. Two or more survey responses contain the exact same free response question answers
4. Answers to free response questions do not address the topic of the question asked
5. Answers to free response questions consist of strings of consonants or resemble keysmashes
    i. Example: sgnbsw, azwheqatda, warshbresjny
6. Provided zip code and neighborhood name are not located in Seattle *and* do not correspond to each other
    i. Example: Georgetown 90004 (a neighborhood in Washington D.C. and a zip code for Los Angeles, CA)
7. Survey respondent typed full address when asked what neighborhood they reside in *and* the address does not correspond with the provided zip code or cannot be found by google maps
    i. Example: 3875 Rainbow Road 92801 (a zip code in Anaheim, CA and an invalid street address)
8. Survey respondent typed full address when asked what neighborhood they reside in and the address exists but belongs to a commercial business
9. Respondents only responded to demographic questions and left all questions about the food forest entirely blank

Appendix G

Dedoose Codebook for Qualitative Survey Questions and Interviews

Title	Description
[Re]Connecting with Nature	Mentions of (re)connecting with the natural world, ecosystems or ecosystems, respondent speaks of building relationship with plants/landscape, being a part of nature
Community Resource	Mentions of BFF/its component parts being a general resource for the community or benefiting the community in a general sort of way, with few specifics given
Critiques/Negative Comments	Any critiques people had of BFF, negative statements, constructive criticism, etc.
Barrier to Participation	Mentions of perceived or potential barriers to participating or engaging with the food forest
Learning About Plants/Ecosystems (Edible & not)	Mentions of learning about plant species, the edible or medicinal uses of plants, information about ecosystems (specific or general), climate or climate change, or other environmental topics
Teaching About Plants/Ecosystems (Edible & not)	Mentions of teaching about plant species, the edible or medicinal uses of plants, information about ecosystems (specific or general), climate or climate change, or other environmental topics
Air quality/Noise Control	Mentions of BFF improving or regulating air quality and/or mitigating noise pollution
Climate Change Mitigation	Talking about BFF as mitigating/contributing to mitigating the negative effects of climate change (ex. drought, urban heat islands, etc)
Ecosystem Supports	Mentions water, nutrient, or energy cycles or general wellbeing of ecosystems
Water Regulation	Mentions BFF in relation to water regulation topics such as flood mitigation, drought prevention or mitigation, etc.
Wildlife Habitat	Mentions of BFF providing habitat for animals/wildlife within the city

Express Cultural Heritage	Mentions of BFF facilitating the expression of cultural heritage by an individual or groups through planting, tending, harvesting, processing, etc.)
Inspiration, Peace, or Joy	Mentions of deriving emotional or other intangible benefits from the food forest, particularly inspiration, peace or joy
Decreased Participation	Mentions of decreased participation/engagement with the food forest for any reason
Gather seeds/cuttings	Mentions of personally gathering seeds and/or cuttings from plants in the food forest or from the seed library on site
Harvests Food or Medicine	Mentions of personally harvesting edible or medicinal plant materials from the food forest
Harvests Inedible/Non'-'Medicinal	Mentions of personally harvesting inedible or non-medicinal plant materials from the food forest
Increased Participation	Mentions of increased participation/engagement with the food forest for any reason
Recreation	Mentions of engaging with the food forest for fun or relaxation, walking through, or using it in ways not specificed by other codes
Spiritual/Reglious	Mentions of the food forest as an aspect of their spiritual or religious lives or that they actively use materials from the food forest for their spiritual/religious traditions
Unfamiliar	Respondents who have never visited or were unsure about what BFF is
Visiting (unspecified)	Respondents speaks about visiting the food forest, but without specifying what the nature of the visit entailed (ex. Volunteering, visiting friends, harvesting, just passing through, for relaxation, etc.)
Volunteering	References to work parties, volunteering, working in the food forest alone or with others
Connecting with People or Building Community	Mentions of being brought by others or bringing friends to the food forest, developing friendships, talking with others at the food forest, community building or feelings of connections to a group of individual, facilitated by the food forest

Maintain or Improve Mental Health	Referring to BFF as influencing the maintenance or improvement of the respondents mental/emotional health
Maintain or Improve Physical Health	References to BFF contributing to maintenance or improvement of respondent's physical health
Personal Benefit/Fulfillment	General references to benefits to the self or feelings of self fulfillment in relation to the food forest; includes both practical/material benefits and less tangible benefits or feelings of fulfillment
Unique or Unusual Aspects of BFF	Mentions of aspects/uses/etc. of BFF which the respondent spoke of as being unusual or unique to the food forest compared to other outdoor spaces that they interact with
Wishes, Desires, Aspirations for BFF	Expressing an idea of what they would like BFF to become or implement and how it might/should change

References

Alcamo, Joseph, Neville J. Ash, Colin D. Butler, J. Baird Callicott, Stephen R. Carpenter, Juan Carlos Castilla, Robert Chambers, Kanchan Chopra, Angela Cropper, and Gretchen C. Daily. 2003. *Ecosystems and Human Well-Being: A Framework for Assessment*. Island Press.

Alvarado-Ramos, Fernando, Alejandro Casas, Roberto Alexander Fisher-Ortíz, Ana Isabel Moreno-Calles, Selene Rangel-Landa, Alexis Daniela Rivero-Romero, Yessica Angélica Romero-Bautista, Dídac Santos-Fita, and Mariana Vallejo-Ramos. 2016. "Ethnoagroforestry: Integration of Biocultural Diversity for Food Sovereignty in Mexico." *Journal of Ethnobiology and Ethnomedicine* 12 (November): 54. https://doi.org/10.1186/s13002-016-0127-6.

Angelo, Mary Jane. 2017. "Food Security, Industrialized Agriculture, and a Changing Global Climate: Perspectives on the United States and Cuba." *Food Security* 29: 27.

Armstrong, Chelsey Geralda, Dana Lepofsky, Alex McAlvay, Jesse Miller, and Patrick Morgan Ritchie. 2021. "Historical Indigenous Land-Use Explains Plant Functional Trait Diversity." *Ecology and Society* 26 (2). https://doi.org/10.5751/ES-12322-260206.

Arnberger, Arne, and Renate Eder. 2012. "The Influence of Green Space on Community Attachment of Urban and Suburban Residents." *Urban Forestry & Urban Greening* 11 (1): 41–49. https://doi.org/10.1016/j.ufug.2011.11.003.

Arrington, Austin B., Stewart A.W. Diemont, Caleb T. Phillips, and Ethan Z. Welty. 2017. "Demographic and Landscape-Level Urban Foraging Trends in the USA Derived from Web and Mobile App Usage." *Journal of Urban Ecology* 3 (1): jux006. https://doi.org/10.1093/jue/jux006.

Artmann, Martina, Katharina Sartison, and Jan Vávra. 2020. "The Role of Edible Cities Supporting Sustainability Transformation – A Conceptual Multi-Dimensional Framework Tested on a Case Study in Germany." *Journal of Cleaner Production* 255 (May): 120220. https://doi.org/10.1016/j.jclepro.2020.120220.

Barthel, Stephan, Johan Colding, Anne-Sofie Hiswåls, Peder Thalén, and Päivi Turunen. 2022. "Urban Green Commons for Socially Sustainable Cities and Communities." *Nordic Social Work Research* 12 (2): 310–22. https://doi.org/10.1080/2156857X.2021.1947876.

Bukowski, Catherine, and John F. Munsell. 2018. *The Community Food Forest Handbook: How to Plan, Organize, and Nurture Edible Gathering Places*. 1st ed. Chelsea Green Publishing.

Cattell, Vicky, Nick Dines, Wil Gesler, and Sarah Curtis. 2008. "Mingling, Observing, and Lingering: Everyday Public Spaces and Their Implications for Well-Being and Social Relations." *Health & Place* 14 (3): 544–61. https://doi.org/10.1016/j.healthplace.2007.10.007.

City of Seattle. n.d. “Exploring the Patterns of People in Seattle and the Region.” GIS map. Accessed October 13, 2022. https://seattlecitygis.maps.arcgis.com/apps/MapSeries/index.html?appid=a447494df6e14dbba356963a9442834a.

Clark, Kyle H., and Kimberly A. Nicholas. 2013. “Introducing Urban Food Forestry: A Multifunctional Approach to Increase Food Security and Provide Ecosystem Services.” *Landscape Ecology* 28 (9): 1649–69. https://doi.org/10.1007/s10980-013-9903-z.

Colding, Johan, and Stephan Barthel. 2013. “The Potential of ‘Urban Green Commons’ in the Resilience Building of Cities.” *Ecological Economics*, Sustainable Urbanisation: A resilient future, 86 (February): 156–66. https://doi.org/10.1016/j.ecolecon.2012.10.016.

Dasgupta, Rajarshi, Mrittika Basu, Shizuka Hashimoto, Ronald C. Estoque, Pankaj Kumar, Brian Alan Johnson, Bijon K. Mitra, and Priyanka Mitra. 2022. “Residents’ Place Attachment to Urban Green Spaces in Greater Tokyo Region: An Empirical Assessment of Dimensionality and Influencing Socio-Demographic Factors.” *Urban Forestry & Urban Greening* 67 (January): 127438. https://doi.org/10.1016/j.ufug.2021.127438.

Díaz, Sandra, Sebsebe Demissew, Julia Carabias, Carlos Joly, Mark Lonsdale, Neville Ash, Anne Larigauderie, et al. 2015. “The IPBES Conceptual Framework — Connecting Nature and People.” *Current Opinion in Environmental Sustainability*, Open Issue, 14 (June): 1–16. https://doi.org/10.1016/j.cosust.2014.11.002.

Eiden, Sarah. 2022. “The Place of Community Food Forests: A Review and Case Study of Community Food Forests and Their Untapped Potential.” Missoula, MT: University of Montana. https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=12852&context=etd.

Fuller, Richard A., Katherine N. Irvine, Patrick Devine-Wright, Philip H. Warren, and Kevin J. Gaston. 2007. “Psychological Benefits of Greenspace Increase with Biodiversity.” *Biology Letters* 3 (4): 390–94. https://doi.org/10.1098/rsbl.2007.0149.

Garrett, Harold E. "Gene, Shibu Jose, and Michael A. Gold, eds. 2022. *North American Agroforestry*. 3rd ed. American Society of Agronomy.

GISGeography. 2018. “Map of Seattle, Washington.” GIS Geography. June 17, 2018. https://gisgeography.com/seattle-map-washington/.

Gonçalves, André Luiz Rodrigues, Alexander Wezel, Barbara Gemmill Herren, Rachel Bezner Kerr, Edmundo Barrios, and Fergus Sinclair. 2020. “Agroecological Principles and Elements and Their Implications for Transitioning to Sustainable Food Systems. A Review.” *Agronomy for Sustainable Development* 40 (6): 40. https://doi.org/10.1007/s13593-020-00646-z.

Groot, Rudolf, Matthew Wilson, and Roelof Boumans. 2002. “A Typology for the Classification Description and Valuation of Ecosystem Functions, Goods and Services.” *Ecol Econ* 41 (February). https://doi.org/10.1016/S0921-8009(02)00089-7.

Hart, Robert A. de J. 2009. *Forest Gardening: Rediscovering Nature & Community in a Post-Industrial Age*. Revised&Updated ed. Totnes: Green Books.

Hemmelgarn, Hannah L., and John F. Munsell. 2021. "Exploring 'beyond-Food' Opportunities for Biocultural Conservation in Urban Forest Gardens." *Urban Agriculture & Regional Food Systems* 6 (1): e20009. https://doi.org/10.1002/uar2.20009.

Herder, M. den, F. Herzog, M. R. Mosquera-Losada, and A. Pantera. 2021. "Agroforestry and the Environment." *Agroforestry Systems* 95 (5): 767–74. https://doi.org/10.1007/s10457-021-00640-8.

Holmgren, David. 1996. *Permaculture Principles and Pathways Beyond Sustainability*. Permanent Publications. https://derdejan.files.wordpress.com/2020/06/permaculture-principles-and-pathways-beyond-sustainability-pdfdrive.com-.pdf.

Holtan, Meghan T., Susan L. Dieterlen, and William C. Sullivan. 2015. "Social Life Under Cover: Tree Canopy and Social Capital in Baltimore, Maryland." *Environment and Behavior* 47 (5): 502–25. https://doi.org/10.1177/0013916513518064.

Johnson Gaither, Cassandra, Amanda Aragon, Marguerite Madden, Sheridan Alford, Aza Wynn, and Marla Emery. 2020. "'Black Folks Do Forage': Examining Wild Food Gathering in Southeast Atlanta Communities." *Urban Forestry & Urban Greening* 56 (October): 126860. https://doi.org/10.1016/j.ufug.2020.126860.

King County. n.d. "Census Viewer 2022." King County GIS Center. Accessed December 3, 2022. https://experience.arcgis.com/experience/2e2dc414086648128bbf96f552817e7e.

Krüger, Georg. 2016. "Peri urban agriculture in Casablanca." Undergraduate, Swedish University of Agricultural Sciences.

Lehmann, Lisa Mølgaard, Marin Lysák, Luke Schafer, and Christian Bugge Henriksen. 2019. "Quantification of the Understorey Contribution to Carbon Storage in a Peri-Urban Temperate Food Forest." *Urban Forestry & Urban Greening*, Urban Food Forestry: current state and future perspectives, 45 (October): 126359. https://doi.org/10.1016/j.ufug.2019.06.002.

Lele, Sharachchandra, Oliver Springate-Baginski, Roan Lakerveld, Debal Deb, and Prasad Dash. 2013. "Ecosystem Services: Origins, Contributions, Pitfalls, and Alternatives." *Conservation and Society* 11 (4): 343–58.

Linnekin, Baylen J. 2018. "Food Law Gone Wild: The Law of Foraging." *Fordham Urban Law Journal*. https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=2740&context=ulj.

Lovell, Sarah, and John Taylor. 2021a. "Chapter 5: Urban Agroforestry As a Strategy For Aligning Agroecology With Resilience Planning Initiatives." In *Resourcing an Agroecological Urbanism; Political, Transformational, and Territorial Dimensions*, 101–18. Routledge.

———. 2021b. “Designing Multifunctional Urban Agroforestry with People in Mind,” May. https://sci-hub.se/https://doi.org/10.1002/uar2.20016.

Mansourian, Stephanie, Christoph Wildburger, and Bhaskar Vira, eds. 2015. “3.2.1 Historical Overview and the Role of Traditional Knowledge.” In *Forests and Food: Addressing Hunger and Nutrition Across Sustainable Landscapes*, 76–77. https://sci-hub.se/10.11647/obp.0085.

Marconi, Patricia Laura, this link will open in a new window Link to external site, Patricia Eleonora Perelman, and Vanina G. Salgado. 2022. “Green in Times of COVID-19: Urban Green Space Relevance during the COVID-19 Pandemic in Buenos Aires City.” *Urban Ecosystems* 25 (3): 941–53. https://doi.org/10.1007/s11252-022-01204-z.

Masterson, Vanessa A., Johan P. Enqvist, Richard C. Stedman, and Maria Tengö. 2019. “Sense of Place in Social–Ecological Systems: From Theory to Empirics.” *Sustainability Science* 14 (3): 555–64. https://doi.org/10.1007/s11625-019-00695-8.

Millennium Ecosystem Assesssment. 2005. “Overview of the Millennium Ecosystem Assessment.” 2005. https://www.millenniumassessment.org/en/About.html.

Nytofte, Josefine Lærke Skrøder, and Christian Bugge Henriksen. 2019. “Sustainable Food Production in a Temperate Climate – a Case Study Analysis of the Nutritional Yield in a Peri-Urban Food Forest.” *Urban Forestry & Urban Greening*, Urban Food Forestry: current state and future perspectives, 45 (October): 126326. https://doi.org/10.1016/j.ufug.2019.04.009.

Pandeya, B., W. Buytaert, Z. Zulkafli, T. Karpouzoglou, F. Mao, and D. M. Hannah. 2016. “A Comparative Analysis of Ecosystem Services Valuation Approaches for Application at the Local Scale and in Data Scarce Regions.” *Ecosystem Services*, Integrated valuation of ecosystem services: challenges and solutions, 22 (December): 250–59. https://doi.org/10.1016/j.ecoser.2016.10.015.

Pascual, Unai, Patricia Balvanera, Sandra Díaz, György Pataki, Eva Roth, Marie Stenseke, Robert T Watson, et al. 2017. “Valuing Nature’s Contributions to People: The IPBES Approach.” *Current Opinion in Environmental Sustainability*, Open issue, part II, 26–27 (June): 7–16. https://doi.org/10.1016/j.cosust.2016.12.006.

Pinto-Correia, Teresa, and Willem Vos. 2004. “Multifunctionality in Mediterranean Landscapes - Past and Future.” In *The New Dimensions of the European Landscape*, edited by R. H. G. Jongman, 4:135–64. Wageningen UR Frontis Series. Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-1-4020-2911-0_10.

Potschin, Marion, and Roy Haines-Young. 2013. “Landscapes, Sustainability and the Place-Based Analysis of Ecosystem Services.” *Landscape Ecology* 28 (6): 1053–65. https://doi.org/10.1007/s10980-012-9756-x.

Raymond, Christopher, Gregory Brown, and Delene Weber. 2010. “The Measurement of Place Attachment: Personal, Community, and Environmental Connections.” *Journal of Environmental Psychology* 30 (December). https://doi.org/10.1016/j.jenvp.2010.08.002.

Rebisz, Suzy. 2021. “The Socio-Cultural Value of Food Forests in the Netherlands.” Masters, the Netherlands: Wageningen University. https://edepot.wur.nl/553478.

Riolo, Francesca. 2019. “The Social and Environmental Value of Public Urban Food Forests: The Case Study of the Picasso Food Forest in Parma, Italy.” *Urban Forestry & Urban Greening*, October.

Rockwell, Cara A., Alex Crow, Érika R. Guimarães, Eduardo Recinos, and Deborah La Belle. 2022. “Species Richness, Stem Density, and Canopy in Food Forests: Contributions to Ecosystem Services in an Urban Environment.” *Urban Planning* 7 (2): 139–54. https://doi.org/10.17645/up.v7i2.5135.

Sardeshpande, Mallika, Christoph Rupprecht, and Alessio Russo. 2021. “Edible Urban Commons for Resilient Neighbourhoods in Light of the Pandemic.” *Cities* 109 (February): 103031. https://doi.org/10.1016/j.cities.2020.103031.

Seattle Department of Neighborhoods. 2019. “Beacon Hill Snapshot.” City of Seattle Department of Neighborhoods. https://www.seattle.gov/documents/Departments/Neighborhoods/Districts/Neighborhood%20Snapshots/Beacon-Hill-Snapshot.pdf.

———. n.d. “Beacon Food Forest.” Seattle Department of Neighborhoods. Accessed September 18, 2022. https://www.seattle.gov/neighborhoods/programs-and-services/p-patch-community-gardening/p-patch-list/beacon-food-forest.

Shackleton, Charlie, Patrick Hurley, Annika Dahlberg, Marla Emery, and Harini Nagendra. 2017. “Urban Foraging: A Ubiquitous Human Practice but Overlooked by Urban Planners, Policy and Research.” *Sustainability* 9 (October): 1884. https://doi.org/10.3390/su9101884.

Shi, Xiaoying. 2022. “The Urban Food Forest: Creating a Public Edible Landscape.” *URBAN DESIGN International*, July. https://doi.org/10.1057/s41289-022-00191-z.

Toensmeier, Eric, Rafter Ferguson, and Mamta Mehra. 2020. “Perennial Vegetables: A Neglected Resource for Biodiversity, Carbon Sequestration, and Nutrition.” *PLOS ONE* 15 (7): e0234611. https://doi.org/10.1371/journal.pone.0234611.

Trust for Public Land. 2022. “2022 ParkScore Index Seattle, WA.” Trust for Public Land. https://parkserve.tpl.org/mapping/pdfs/Seattle_WA.pdf.

“Wetherby Edible Forest | Learn, Grow, Harvest and Celebrate.” n.d. Icbya. Accessed April 9, 2023. https://www.backyardabundance.org/wetherby.

Wiek, Arnim, and Stefanie Albrecht. 2021. “Food Forests: Their Services and Sustainability.” *Journal of Agriculture, Food Systems, and Community Development*, July, 91–105.

Wolf, Kathleen L., Sharon T. Lam, Jennifer K. McKeen, Gregory R.A. Richardson, Matilda van den Bosch, and Adrina C. Bardekjian. 2020. “Urban Trees and Human Health: A Scoping Review.” *International Journal of Environmental Research and Public Health* 17 (12): 4371. https://doi.org/10.3390/ijerph17124371.